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THE FOUNDRY

Vol. 21. *CLEVELAND, OHIO, DECEMBER, 1902.* *No. 124.*

PUBLISHED MONTHLY BY
THE IRON AND STEEL PRESS CO.
ROSE BLDG., CLEVELAND, OHIO.

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JOHN A. PENTON, VICE-PRESIDENT.
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CHICAGO: 519 Monadnock Blk., GEO. H. GRIFFITHS.
PITTSBURG: 429 Park Bldg., A. O. BACKERT.
NEW YORK: 150 Nassau St., D. C. WARREN.
THE CENTRAL WEST: R. A. EVANS.

The subscription price of THE FOUNDRY is $1.00 a year to points in the United States, Canada and Mexico. To Great Britain: Eight Shillings.

Practical articles pertaining to the trade in all its branches are solicited and will be paid for.

We can begin subscriptions with the current number only.

Entered as second class matter at the Post-Office at Cleveland, Ohio.

Trade Outlook.

The decision of the H. C. Frick Coke Co., the leading producer of the Connellsville region, not to supply the foundry trade with coke after existing contracts have expired comes as a surprise to the foundrymen of the country. Frick's Connellsville coke has for many years been regarded as the standard fuel for melting iron and it is relatively a short time ago since coke from other fields entered the market. In addition to dropping the foundries from its list of customers the Frick Co. will also curtail the amount of coke now going to blast furnaces, by confining this to such producers as furnish iron to the steel works of the United States Steel Corporation. The retirement of the Frick Co. from the foundry field is causing some uneasiness among melters of iron as new sources of supply must be found. The immediate effect will be to sustain present prices for some time to come and it is not certain but that higher values may prevail later. The high price and scarcity of anthracite coal makes it out of the question to look for relief from that quarter, or else there can be but little doubt that melters who formerly used anthracite would revert to that fuel again. Difficulty is found in placing orders with independent operators owing to the fact that these have nearly all the business they can take care of and even if their capacity would permit them to take on more orders the unfortunate jam existing on the railroads would prevent them from making shipments with any degree of regularity. It is estimated that about 3,000 new coke ovens will be placed in operation by Jan. 1, 1903, and nearly double that number are expected to be started during the six months following. A great number of these will of course not be turning out foundry coke, yet the general increase in production should make cupola fuel more plentiful than it has been for many months. As said before, however, it is if anything more of a question to provide railroad facilities to handle this material than it is to increase the number of ovens in the coke fields.

Both furnaces and foundries have suffered for a lack of fuel during the past month and shut-downs have been numerous. There is as yet no let-up in the volume of new enterprises or the extensions taking place among existing plants. The malleable trade seems peculiarly active, although undoubtedly many of the projected enterprises in this branch will never materialize. The use of steel castings is also widening and works to supply the increased demand are being built throughout the Central West.

Touching upon the general conditions in the iron trade, Rogers, Brown & Co. say in a recent market report that so far as prices are concerned, every well-wisher of the trade hopes the crest has been reached and passed. It is in every way desirable that a check should be put on the speed of the last twelve months. We can not go on running up cost of production without a day of settlement. We can not avoid steady increase of costs while labor and transportation are over-taxed, and the former, at least, feels that it has not even yet had its fair share of the good things going. A steady settling of prices to something like a normal level would be the best thing that could happen. It is hard to say, however, how it can come while active consumptive demand largely

exceeds our rate of production and that is still the case in all heavy lines of manufacture.

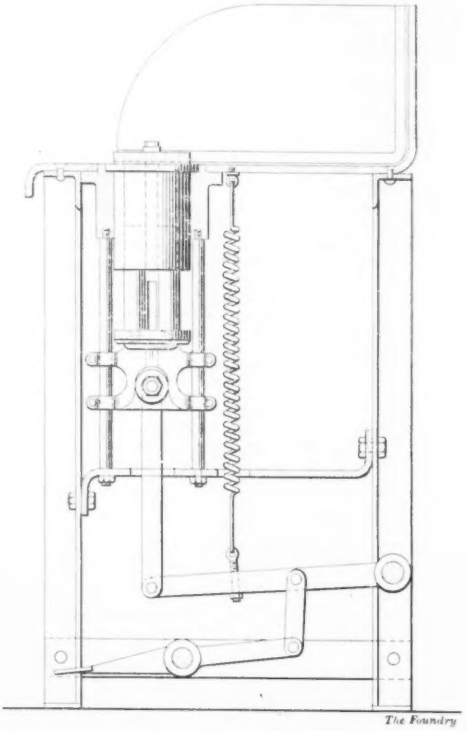
The wide difference between "spot" and "future" quotations is shrinking as we near the merging of the current year into 1903. As predicted and very much desired, the foreign irons have served the trade admirably in two ways; first, in affording a needed supply, averting a stoppage of many foundries; second, in steadying prices of the domestic product. The 400,000 tons imported during the first ten months of the year have been of incalculable benefit to the country. This tonnage added to the about 150,000 tons consumed of the stocks left over in the furnace yards January 1st last, represents the supplies melted in addition to the regular current product of domestic furnaces. Consumers' iron yards are practically bare as compared with their stocks at the beginning of the year when they were found lean enough for comfort.

The Thomas and Clare Core Machine.

A patent was recently granted I. B. Thomas and Peter Clare, of Altoona, Pa., upon the core machine shown in the illustrations. With this machine the cores are made in multiple, the number turned out at one operation depending upon the size of the cores and consequently upon the number of these which the die will accommodate. With a certain core used in the Christie brake shoe castings three are made at one time, while with some of the smaller cores as many as eight or ten are made at once.

THE THOMAS AND CLARE CORE MACHINE.

The machine is mounted on a core bench as shown, a bushing permitting of quickly changing the dies and plungers. In operating the machine the plungers are lowered and core sand swept over the dies, filling the openings corresponding in form to the cores to be made. A stop is placed between the die and the plunger disc, which regulates the length of the core, when the cover is closed over the top of the die and the sand compressed by means of the foot treadle. The cover and stop are then removed and the cores pushed out of the die by the plungers, actuated by the treadle, when they are placed on a plate and removed to the core oven for drying.



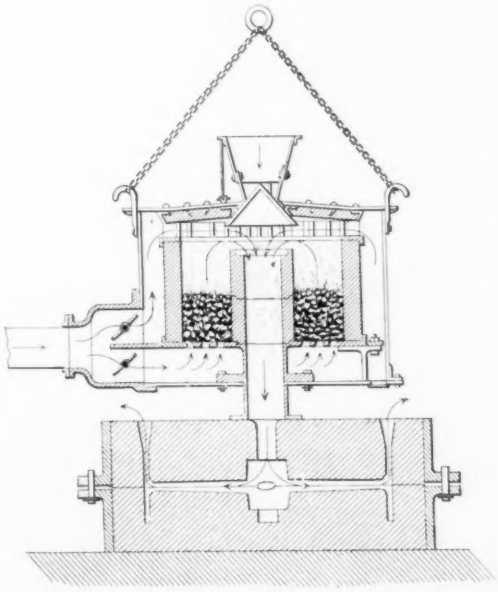
SECTIONAL VIEW OF THE THOMAS AND CLARE CORE MACHINE.

There are two of these core machines in service at the foundry of the Pennsylvania Railroad Co., Altoona, Pa., and one in the same company's foundry at Renovo, Pa., and all have been giving excellent satisfaction. They are making 5/8, 3/4, 7/8-inch all round cores up to 3 inches in length, and the 1, 1 1/8 and 1 1/4-inch up to 4 inches in length; the Christie brake rubber core; skim gate cores; various stop cores and a number of other cores are also made on the Thomas and Clare machine, and one man very readily turns out 2,400 cores in about 8 hours.

One of the advantages in this machine is the extreme accuracy with which it is made, and the fact that there is almost no wear on the dies. Some of these have been in use for considerably over 2 years, and show no appreciable signs of giving out. We understand that arrangements will shortly be made by the inventors for placing this core machine upon the market.

An English Mold Drying Apparatus.

Outside of one or possibly two foundries in the United States no attempts have been made to improve the methods in common vogue for drying molds. Where these are too large to permit of being placed in ovens, charcoal baskets distributed to the best advantage over the surface of the mold generally form the medium



APPARATUS FOR DRYING MOLDS.

through which moisture is removed. In some parts of the country where natural gas is plentiful this fuel is largely employed for skin drying molds and with suitable burners it can also readily be used for drying loam and dry sand molds.

We show with this an illustration of a portable drying apparatus, manufactured by J. W. & C. J. Phillips, of London, England. It is intended that this be suspended over a mold by a crane or hoist, or it may be supported by stands placed alongside of the mold to be dried. The heater consists of an outer shell or mantle, provided with valves for regulating the volume of air, and an inner fire chamber, which is intended to use coke as a fuel.

In operation air is furnished by a small blower connected to the heater and as it enters this, one part passes through the fire chamber and is there heated while another portion passes through the space between the fire chamber and the outer shell, both currents meeting at the outlet pipe and through it enter the mold. The temperature of the air forced into the mold is regulated by the volume of air passing through the fire chamber. If the outer current be diminished a greater volume of air will pass through the fire chamber and the temperature will rise, while if the valve regulating the inner current of air be closed, the larger portion of the air will enter the outer chamber, and the temperature will be correspondingly lowered.

It is stated by those having these mold dryers in use that a mold is dried very rapidly owing to the fact that the moisture is removed very fast by the continual flow of air and that no unpleasant gases have been noted from their operation. About 50 pounds of coke will keep the smaller of these heaters in operation for an hour and a half, the air consumed being nearly 200 cubic feet per minute.

Get the Cash.

The Bad Axe Foundry will pay for all kinds of iron delivered at their foundry, 40 cents per hundred until further notice. We will also pay 2½ cents per pound for old rubbers. Why trade your old iron and rubbers for old rotton tinware when you can get the cash.—Bad Axe (Mich.) *Democrat.*

An English Joke.

Between iron founders:

Smith: How's the furnace?
Jones: The dam plate is broken.
Smith: Blast?
Jones: Can't get enough.
Smith: What bosh?
Jones: Oh! er—ten feet.

—*The Ironmonger.*

The Hermance Machine Co. is incorporated at Williamsport, Pa., with a capital of $30,000.

The Cumberland Foundry & Machine Co., Cumberland, Md., has been incorporated with a capital stock of $5,000 by George F. Gephart, Frank C. Fleckenstein, Robert Roe, Jr., Thos. E. Roe and Lloyd Lowndes, Jr.

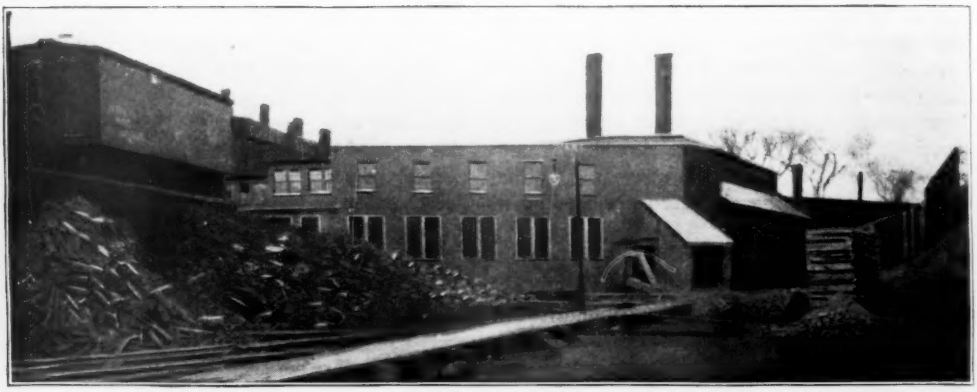


FIG. 1. A PORTION OF THE FOUNDRY AND STOCK YARD.

The Foundry of the Saco & Pettee Machine Shops, Biddeford, Maine.

The State of Maine has never figured very prominently in this country's metal working industries, partly because the raw materials which made other states famous are not found within its borders. Our canvass of 1901 gives Maine 49 iron foundries and 7 brass foundries, the majority of which are operated on a rather small scale. The geographical position of this state will prevent it from ever assuming a high place in iron or steel manufacture except in so far as its citizens may excel in certain specialties. The New England states have always retained a very strong hold upon the manufacture of cotton mill machinery and among the prominent concerns in this line are the Saco & Pettee Machine Shops at Biddeford, Maine, located on the Boston & Maine R. R. an even hundred miles from the city of Boston. The foundry department connected with these works is being looked after by Mr. David Reid and under his care great improvements have been effected in a relatively short time.* Some of these and the general practice in vogue at this establishment will be the subject of this article.

Fig. 1 is a rear view of the foundry including

*Since this article was prepared Mr. Reid has become superintendent of the foundry of the Howard & Bullough American Machine Co., Pawtucket, R. I.

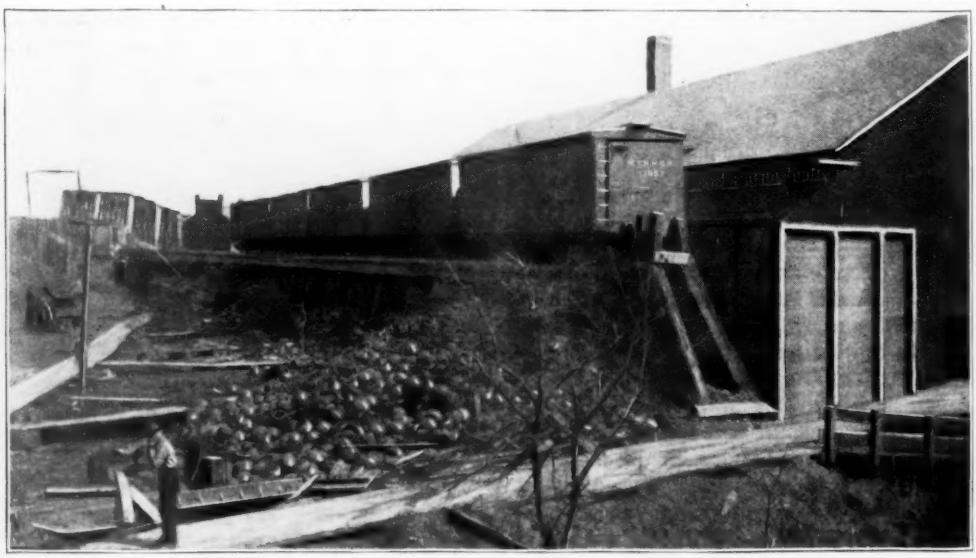


FIG. 2. RAILWAY SIDING AND FOUNDRY STOCK ROOM.

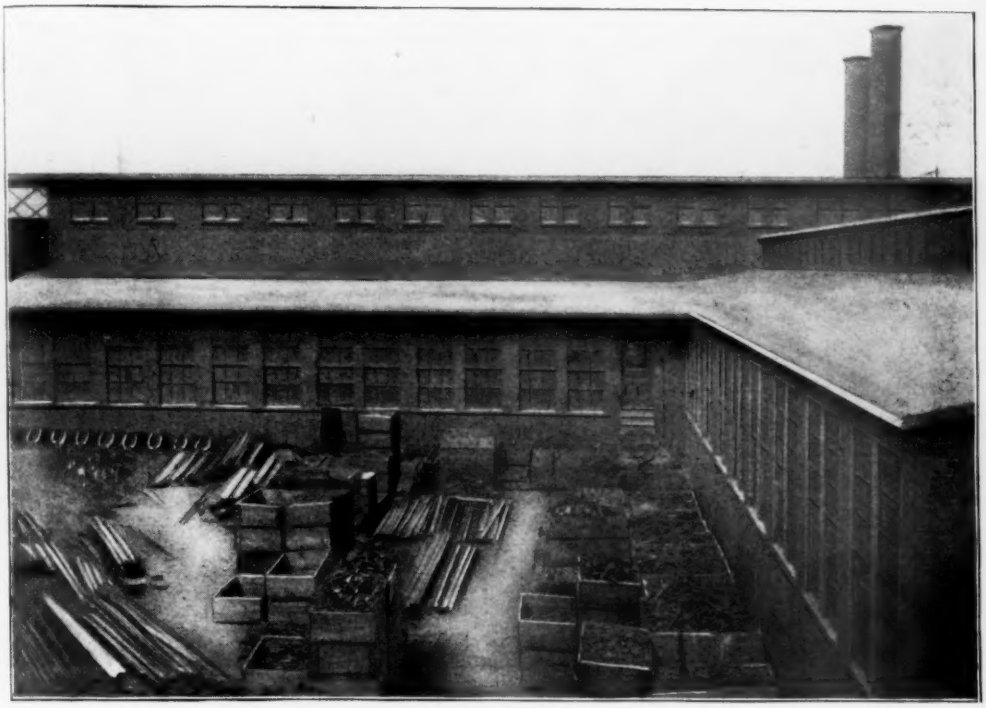


FIG. 3. FOUNDRY AND STOCK OF CASTINGS READY FOR THE MACHINE SHOP.

a portion of the stock yard and the "run" or "walk" leading to the cupola stage. But two cupolas are shown although another has recently been installed which gives the foundry a melting capacity of a hundred tons daily. This is somewhat in excess of the molding capacity of the foundry but it is anticipated that projected extensions will at an early day provide additional floor space for the molders.

Fig. 2 shows the elevated railway siding on which enters all raw material consumed in the entire plant and also furnishing an outlet for the finished product of same, which is shipped to all parts of the country and especially to the Southern states. The building to the right is the foundry stock room, where coke, limestone, molding and core sand, etc., are kept within handy distance. The scrap iron to be seen in the foreground is a remnant of the old style shot and shell, in use during the Civil War forty years ago, and came from Fortress Monroe. It is somewhat unusual to utilize this material in light machinery castings but it was purchased at a time when iron was very scarce and proved itself superior to some brands of pig iron. During the year 1,500 tons of these old shot and shell have been melted at the Saco & Pettee foundry without the least trouble.

As at present arranged the stocks of different brands of iron are distributed over a wide area and part of same at a considerable distance from the cupolas, but it is contemplated to install an electric trolley system for the handling of material in this part of the works, and when this is completed the wheelbarrows will be discarded and less labor required in handling melting stock than is now necessary.

Fig. 3 gives another view of the foundry and stock of castings ready for the machine shop. A few years ago this part of the plant was utilized for the storage of iron and coke, which at that time was hauled in by teams instead of being delivered on the railway siding as is now done. At the present there are about 1,500 tons of castings in this space awaiting the pleasure of the machine shop. The steps seen in the illustration lead to the foundry foreman's office, of which another view appears in Fig. 7. The great variety of castings required by the Saco & Pettee shops is well illustrated in Fig. 4, which shows another view of the stock yard for castings seen in Fig. 3, and although there are nearly 1,800 separate bins, each containing a different class of castings, this number only takes care of a little more than half the stock which is supposed to be kept on hand ready for instant

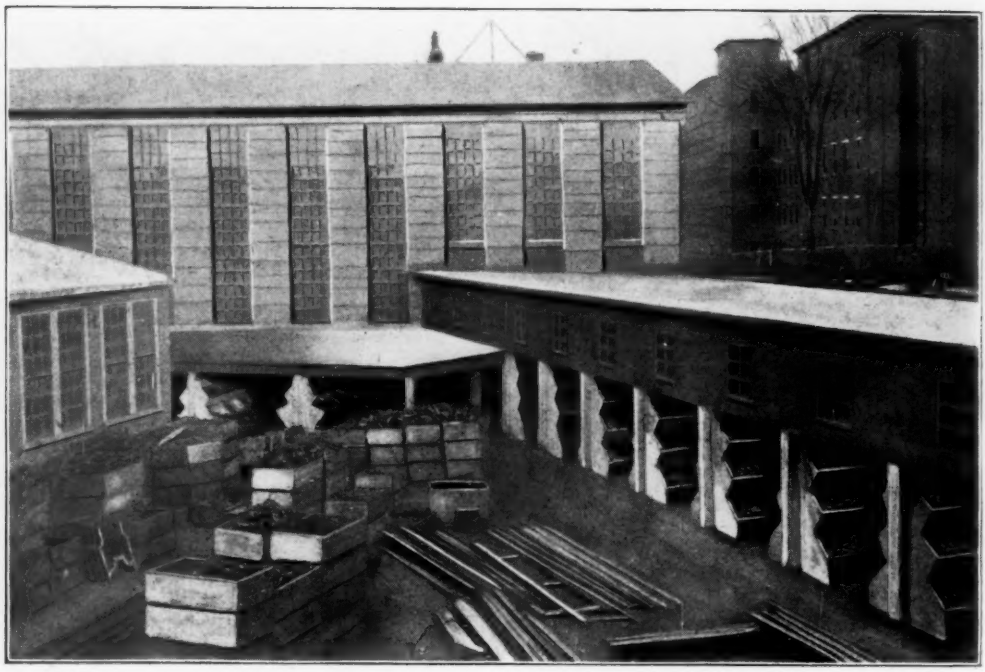


FIG. 4. STOCK YARD WITH STORAGE BINS.

use. The roof of the building on the right is of "foundry construction," that is, when built it was so planned that this building could be turned into a foundry at any time, and it is probable that it will in the near future be extended to the main foundry building shown on the left, when all of this space will be used as a molding room instead of a stock yard.

The stone building at the end of the stock yard is the pattern safe or vault, 100x45 feet in size, in which are stored nearly 16,000 different patterns, a vast number of which are

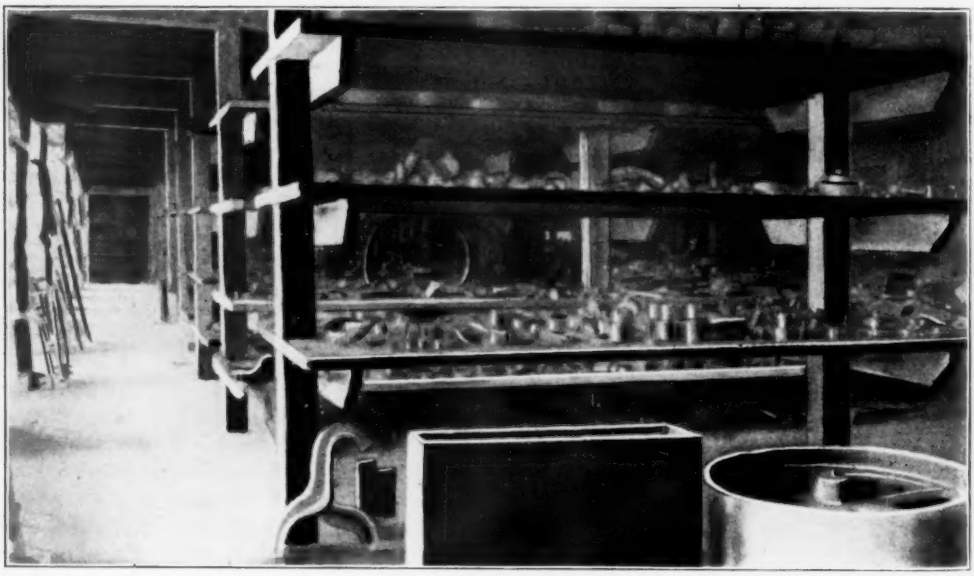


FIG. 5. INTERIOR OF PATTERN VAULT.

FIG. 6. A SECTION OF THE MAIN FOUNDRY.

made from mahogany, forming one of the finest and most complete collections of patterns to be found anywhere. A general view of the interior of the pattern safe is shown in Fig. 5, each section being marked to indicate the class of patterns it contains. Every pattern is numbered and registered, the record showing the particular machine to which it belongs and the number of castings wanted from it to complete a machine. From 1,500 to 2,500 different patterns are used every week in this foundry and it is the large variety of patterns employed that makes it necessary to carry such a large stock of castings for the immediate needs of the machine shop.

Fig. 6 represents a section of the main foundry for bench and side floor molders, having a floor space of 165x110 feet and provided with three gangways running parallel to the one shown in the illustration. Fig. 7 shows an addition, 100x45 feet, that was built two years ago. To the right is the foreman's office, elevated above the foundry floor, one door leading to the foundry and another to the stock yard previously referred to. This office is provided with fifteen windows and the foreman may by simply revolving his chair obtain a view of the greater part of the foundry and those working therein. About half of the castings made in this department are molded on molding machines while the foundry shown in Fig. 8 is given over wholly to machine molding. The latter measures 100x60 feet and is called the machine room after the class of work there turned out.

In Fig. 9 are shown two of the cupolas from one of which two streams of metal are being tapped at the same time into sulky ladles. This is the system adopted of handling melted iron in this establishment and distributing it to the different floors. Another innovation and a striking one when the class of work is

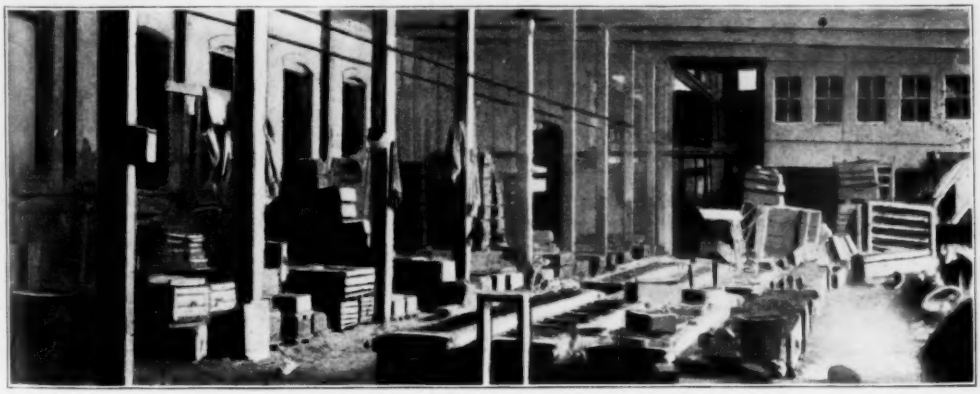


FIG. 7. FOUNDRY ANNEX WITH FOREMAN'S OFFICE.

FIG. 8. THE "MACHINE ROOM," DEVOTED TO MACHINE MOLDING EXCLUSIVELY.

considered is that the molders do not pour their own molds but have this labor performed for them by a regular "pouring gang." When it is further remembered that the majority of the molders employed in this foundry are working on the piece work plan and are held responsible for the loss of castings, and when we call to mind the molder's aversion to have his work poured by any one but himself, the peaceful installation of this system and its radical departure from established shop routine becomes somewhat remarkable. The pouring has now been done in this foundry by other than molders for several months, and having been given a thorough trial, and the results and cost of the new system figured out on a "cold cash basis" the advantages of same can be spoken of with certainty and is by the management of the plant pronounced a perfect success.

As previously referred to, the foundry handles from 1,500 to 2,500 different patterns every week, according to the styles of machines ordered, one of these in its various sizes requiring 1,700 distinct pieces of cast iron to make up a complete machine, and as the heaviest casting without the gate and sprues weighs only 260 pounds, and the others vary from this down to a fraction of an ounce, it will readily be seen that more than ordinary care would be required in having "strangers," whether molders or helpers, pouring other men's work.

The agent, as they have a habit of naming their managers in the Eastern states, of the Saco & Pettee Machine Shops, Mr. W. V.

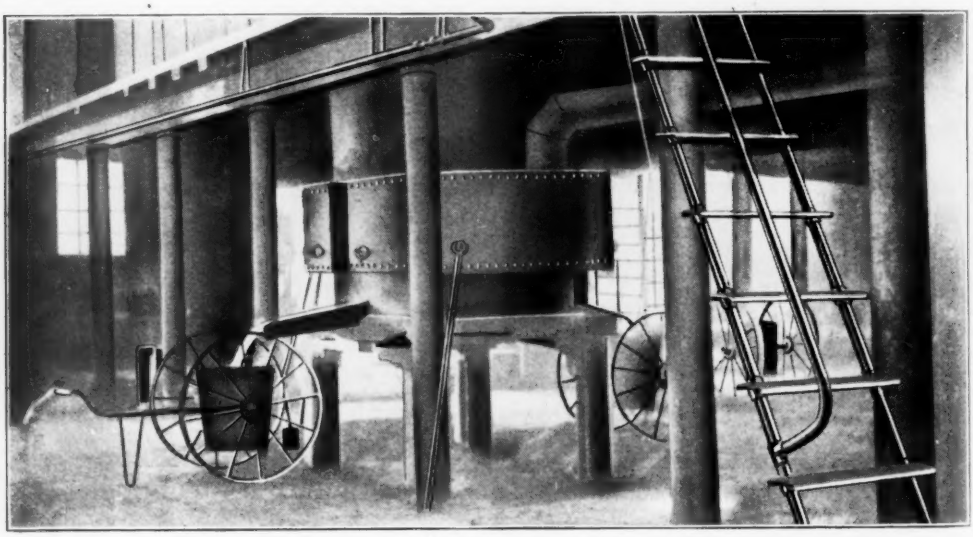


FIG. 9. THE CUPOLAS FROM THE ONE IN THE FOREGROUND TWO STREAMS OF IRON ARE BEING TAPPED INTO SULKY LADLES.

SACO AND PETTEE MACHINE SHOPS. Daily Time Report.

Name.....

Occupation.....

Hours.....

Class of Work.	*Hours.*

Date..... *Hours*.....

Name..... *No.*.....

Occupation..... *Rate*.....

DISTRIBUTION OF TIME.

Hours.	*Amt. of Work.*	*Name or Number.*	*Class of Work.*

Correct..... *Foreman.*

FIG. 10. DAILY TIME REPORT.

Threlfall, a practical progressive young man, suggested to the foundry foreman, Mr. David Reid, that it would be a good thing if it were possible to adopt some such a system of pouring the molds inasmuch as when the blast goes on the molder ceases to be a productive factor and for three hours or more the majority of the molders at least are simply waiting for their turn to pour off. This was two years ago and the reason an earlier attempt was not made to put this system of pouring into force is due to the fact that the plant has been undergoing a general overhauling during this period, resulting in increasing the output of same from sixteen to over fifty tons per day inside of eighteen months.

Mr. Reid says that the first and most important feature which had to be considered in introducing the new system involved the securing of a competent pouring crew. Through the introduction of molding machines and by working a double crew for several months the desired opportunity for training men for this purpose offered itself and today they have more competent pourers than are actually needed, in fact the number of these is sufficient to permit of changing crews every other week, and it is believed that any shop intending to follow along these lines will be compelled to keep a surplus of pourers on hand, so that the work shall not become too exhausting, especially during the hottest months of the year.

The next step taken was to lay out the work in such a way that the shop could readily be divided into sections, and as far as practicable all castings of a similar character be grouped by themselves. On the bench work

Date Ordered..... by..... Date Delivered.....

Delivered to..... Attended to by.....

Number of Pieces	Name or Number of Piece	Made by	Date Made	REMARKS

Acknowledged by.....

FIG. 11. ORDER BLANK FOR DEPARTMENTS OUTSIDE OF THE FOUNDRY.

Saco and Pettee Machine Shops, Biddeford, Me., _____ *190*

_____ *Department.*

Every Monday, overseers will cause all work or material which is unfit for use, to be weighed and disposed of in its proper place. They will make records under the headings below, stating kind of frame, name and weight of piece and cause or reason for such unfitness.

Defective Castings from Foundry.	Roving.	Spinning.	Spoolers.	Miscl.
Total.				

Work Spoiled in Finishing Including Forgings and Castings.	Roving.	Spinning.	Spoolers.	Miscl.
Total.				

Signed. _____ Foreman.

FIG. 12. RECORD BLANK FOR DEFECTIVE CASTINGS.

five pourers are allowed to each section of fifteen molders, that number of pourers having been found able to handle a buggy ladle of iron (500 pounds) to the best advantage. For the floor work, four pourers and four skimmers take care of the molding done by forty journeymen.

Each pourer who handles a "single-hand" ladle carries every heat from fifteen hundred to twenty-five hundred pounds of iron, while those who pour with bull ladles of course handle very much more, yet have, if anything, easier work than the single pourers. In every case the iron is brought to each crew in the buggy ladles, so that there is no actual carrying of iron except such as is necessary on each floor to reach the molds from the gangway.

Following the molders are a crew of men (14 in number) who shake out the flasks and pile them up neatly where they belong, afterwards removing the castings to the cleaning room. This same crew also wet and cut over the sand once, leaving the final tempering thereof to the molder himself, thus avoiding the chronic kicking of the molder to the effect that his sand was wet too much by someone else.

As a direct result of introducing this system there has been a gain of molding time of at least two and a half hours per man daily and in several instances there has been a decided improvement in the quality of the castings, due in Mr. Reid's opinion to the fact that the men who are doing the pouring are only too eager to be taught and are at all times under the direction of an assistant foreman.

A sufficient number of men have been trained to do pouring so that it is only necessary to have each man serve two weeks at a time in the pouring crew when he is given a week's rest. Each pourer is assigned to and retains a certain section of the foundry and is familiar with the class of castings being molded on each individual floor therein, thus he knows whether sharp hot iron is required on a floor or if it can be poured with the last metal from the buggy ladle.

At first the molders appeared to be a little uneasy over the new method of pouring off their work, but since they have become better acquainted therewith they are taking more interest in its success and now advises the pourers of any changes which may be made from day to day so that the latter may be fully posted and know what to expect. On the whole the molders appear to be well pleased with the change, even though they produce

FOUNDRY DAILY MELT.

DATE..... 19 RECORDED BY

	COKE					SCRAP	FOUNDRY WASTE	TOTAL	
BED									
First Charge									
Added									
do									
do									
do									
TOTAL									

1 lb Coke Melted..... lbs Iron

Lbs Finished Castings ....No Men.....Average.....

TEST

	Broke at	Deflection
1-3 Heat		
..		
..		
2-3 Heat		
..		
..		

Blast Pressure	
	Ounces
Start	
Middle	
End	

TIME

Blast On

First Iron

Bottom Dropped .....Hrs.....Min. To Melt.....Lbs.

FIG. 13. DAILY MELTING RECORD.

more castings in five days than a larger crew formerly did in six days.

For the past three years a strict cost account of everything pertaining to the foundry has been in vogue at the Saco & Pettee Machine Shops and each month the foreman of the foundry is handed a report showing the cost of all material used, pattern and flask making, repairs, etc., besides labor of every description. Since adopting the system referred to the figures showing the cost of production have been very gratifying.

In obtaining shop costs the "Daily Time Report" shown in Fig. 10 is bound in book form and each slip is filled out by the molders working day work, who retain the stub and tear off the main portion, which they deposit in a box provided for the purpose, from whence they are collected daily by the office boy and copied into a pass or cost book. Each molder has a cost book and in Mr. Reid's office are to be found the record of every molder who has worked in this foundry during the past two years.

The order blank shown in Fig. 11 is for the use of departments outside of the foundry and is intended to cover "rush" order for castings from the foundry. This together with the record blank, Fig. 12, for defective castings, were gotten up by Mr. Reid in order to avoid the bickerings with other departments when verbal instead of written orders are the rule. We all know that a casting may be made and handed over to the machine shop and later be

BIDDEFORD FOUNDRY ACCOUNT.

FINISHED CASTINGS EACH DAY.

CASTINGS MADE FOUR WEEKS ENDING .....

Roving	lbs.
Spinning	"
Miscel.	"
Expense	"
Tools	"
Repairs	"
Patterns	"
	"
	"
	"
	"
Total,	

Price per pound, ...

Pounds of iron melted to one pound of coal, ...

Labor and Materials.

Foundry pay roll four weeks ending .....

Pattern room " " " " " .....

Other labor,

PIG IRON.

lbs. at .....

" " .....

" " .....

" " .....

" " .....

Scrap iron, " " .....

Fuel " " .....

Sand " "

" " .....

" " .....

Vitrol " " .....

Sea coal facing " " .....

Fire sand " " .....

Fire clay " " .....

Hard coal " " .....

Soft coal " " .....

Black lead " " .....

Fire bricks at .....

Total,

FIG. 14. FORM OF MONTHLY STATEMENT SHOWING COST OF PRODUCTION.

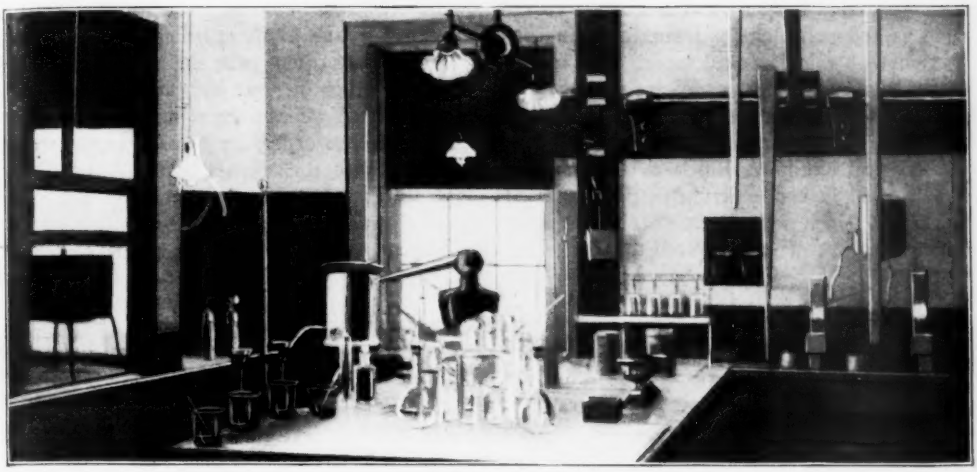


FIG. 15. THE LABORATORY.

misplaced when no one will remember anything in regard thereto. With a signed receipt from the latter department all friction is avoided and a record obtained showing the promptness with which the order has been filled. Defective castings or such of these as are spoiled in the machine shop are retained in this department until the end of the week when they are weighed and inspected by the foreman before being sent to the scrap heap. In this way the standard of the castings turned out in this foundry has been materially raised through ascertaining the exact causes of defective castings from all sources and informing the workmen where improvement is possible and must be made. The actual loss through defective castings has been reduced to a very low minimum.

The two cupolas shown in Fig. 9 are of the Mackenzie type and have been remodeled with two sets of tuyeres. The distance from bottom plate to charging door is only nine feet yet some very good melting is being done right along. The larger of these cupolas when lined measures 70x45 inches and averages 11 tons per hour, melting throughout the year at the rate of one pound of fuel to ten pounds of iron. In a heat of 36 tons a ratio of 1 to 10.75 has been obtained, these figures including the bed of coke which is 1,500 pounds. The average blast pressure used is nine ounces and the speed of melting has at times run up to 12 tons per hour. Fig. 13 is a reduced facsimile of the daily melting record. When the class of work is considered it will readily be conceded that these old style cupolas with their low charging doors are showing a very creditable performance.

The cost of brass castings is arrived at in the same manner as the iron castings, the amount of material in the form of fuel or melting stock which is consumed from day to day is carefully recorded together with the number of crucibles worn out, labor cost incidental to this department, etc. At stated intervals reports are prepared which show exactly what has been accomplished during a certain period and as everything affecting the cost of production is itemized a comparison with former reports of a similar character will instantly show in which details improvement must be made. The general form of these statements is shown in Fig. 14.

It should have been stated before that those laborers who are trained to do pouring receive a premium above their daily wage rate when thus engaged. The latter varies according to the class of work they do regularly, some of them working on the molding machines while others are kept busy in the cleaning room or other departments until their services are required in the foundry proper, when they assume their stations in the pouring crews.

Previous to October, 1901, the Saco & Pettee Machine Shops had all chemical analyses of materials made by outside parties, but since that time a chemical laboratory has been maintained at the works and has proved a very paying investment. In addition to iron, coke and other supplies purchased for the foundry, all materials bought for other departments are also expected to meet chemical specifications. During the recent scarcity of iron when repeated changes had to be made in mixtures this laboratory of which a view is shown in

Fig. 15, proved itself of special value. To the right is the polishing apparatus used in connection with microscopical work. The microscope, balance and dark room are separated by a wood partition in order to protect them from the fumes of the various chemicals employed in analytical work. A Rhiele testing machine is also used in connection with the analytical work, six 1-inch square test bars being made during each heat and tested the following morning.

about one-fourth of the castings turned out in this foundry, all of these being of the lightest character and often mere shells. In the main this is done to increase the production of the machine shop where a great many special machines, built to order, are in use and these are speeded up to the highest limit. Although it is true that the annealing increases the cost of castings in the foundry a small fraction of a cent a pound this is saved to the company four-fold in the other departments through

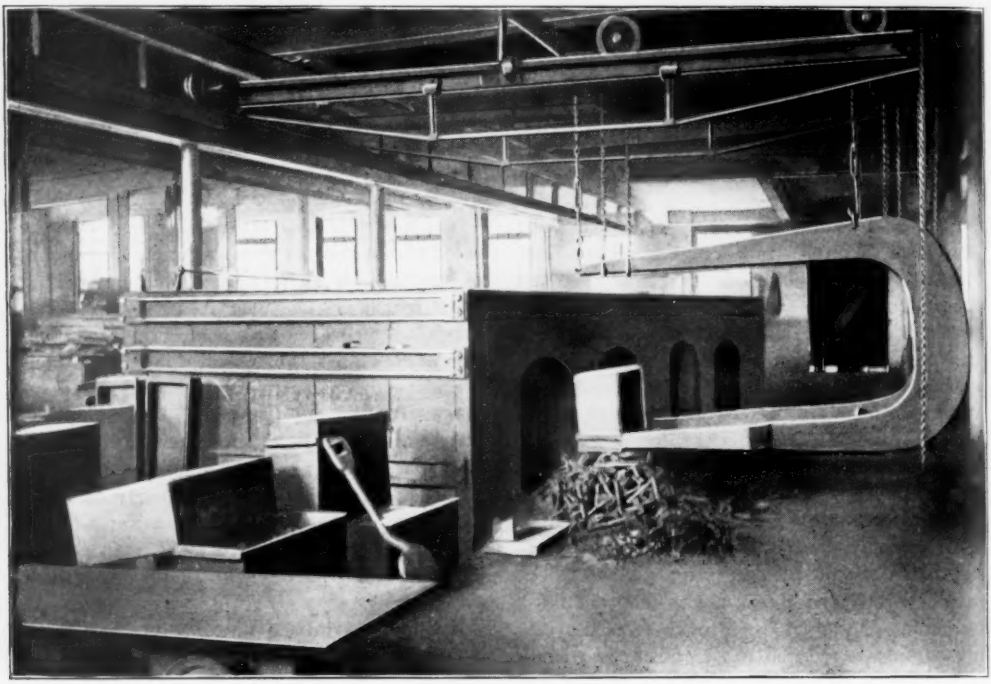


FIG. 16. ANNEALING OVENS FOR GRAY IRON CASTINGS.

The last illustration, Fig. 16, gives a view of the five annealing furnaces, each of which holds five boxes of castings, such as are shown suspended on the crane, or rather on the charging machine attached to the crane. The latter travels the full length of the annealing room and places the boxes in the furnaces and removes them again at the proper time without subjecting the operators to a very high temperature. When removed from the furnaces the boxes containing the annealed castings are placed on the carriage shown in the lower left hand corner and taken to the rear of the furnaces where they are left for twenty-four hours, then unloaded, filled and used over again and again until burned out.

It has been found advantageous to anneal which the castings must pass in the course of being finished. To secure uniform annealing a galvanometer is employed as it has been found that no man can obtain the same results day after day if he trusts his eyes alone.

The Saco & Pettee Machine Shops, operating a large plant at Newton Upper Falls, Mass., as well as the one here described at Biddeford, Maine, have attempted to be of practical service to their employes in obtaining for them the fuel they annually consume at wholesale rates. Early in the year each employe is asked to state the amount of coal he is likely to require and the sum total is added to the corporation's requirements for both plants, when a contract is made for the entire amount f. o. b. the railway sidings at either

place. The company then makes a contract on behalf of the men with a firm of teamsters to deliver the coal at their homes and charges them the exact cost per ton, giving them a month in which to pay for same. This brings the price down to a very low point, in fact the local coal dealers claim it is below wholesale figures and one or two of these have retired from business on this account. Several other firms in this vicinity have adopted this feature during the past two years, resulting in a saving to the men of nearly two dollars per ton. Needless to say, this substantial benefit is appreciated and we believe other shops similarly situated could follow this example without much inconvenience to themselves.

When the Saco Water Power & Machine Shops of Biddeford, Me., became merged with the Pettee Machine Works of Newton Upper Falls, Mass., in 1898, under the title of the Saco & Pettee Machine Shops, there were about 100 names on the payroll of the Biddeford establishment and the foundry was melting from 8 to 9 tons per day, when in operation. At the present time this branch of the Saco & Pettee gives employment to over 800 men and although not as busy as during 1901 yet from 42 to 45 tons of iron are being melted daily.

Green Finish for Brass Goods.

In reply to a question asking for directions for imparting a green finish to brass goods, commonly known as Verde Antique, the *Aluminum World* says that better results are obtained on copper than on brass for the reason that brass contains a large percentage of zinc, which does not take a green color. It is recommended therefore, to copper-plate the article with a thin coating before commencing to stain the object.

Clean the article thoroughly from grease and give it a thorough scratch brush finish with a brass wire scratch brush. Make up a solution consisting of: Vinegar, 1 quart; sal ammoniac, 250 grains; common salt, 250 grains; ammonia, ½ ounce.

Small articles may be immersed in the solution and the liquid allowed to dry on it. When a green froth begins to form, spread with a brush to render it uniform. Dry with a second brush. Allow to stand 24 hours before putting on another coat. After two or three coats have been added the color is usually deep enough.

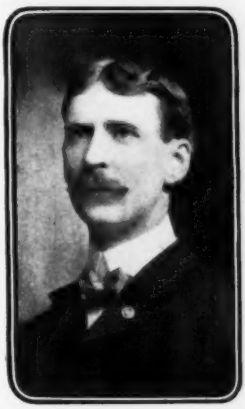
After the proper tint has been produced, dry and lacquer. Brass will take this color, but the result is not as deep and rich as that produced on copper.

Some Notes on English and Continental Foundry Practice.

BY G. E. PICKUP.

The writer has had a varied experience in American foundry practice while introducing the Farwell Molding Machine manufactured by The Adams Co., of Dubuque, Iowa. In this capacity he has visited the greater number of foundries in the United States, and during this time naturally became acquainted with the best methods followed in producing light castings at a minimum cost.

Having taken a great deal of interest in this subject it was, therefore, with considerable satisfaction that I received a commission to go to England in May, 1901, where I landed with two special objects in view. In the first place I was to take notes of any good ideas I came across, and secondly, and possibly this was the more important of the two, to try to demonstrate to the foundrymen of Europe, the great advantages to be gained by the adoption of American labor saving appliances in their shops, particularly in the use of hand molding machines and presses. Being only interested in the best methods of producing light castings, it was largely to this class of foundry work that I paid particular attention.



G. E. PICKUP.

I propose in this article to mostly confine myself to my experiences while in Great Britain, as a few months spent in traveling throughout Germany, France and Belgium do not permit one to quote with authority or fairness the conditions prevailing in those countries. It may at once be said that although up-to-date foundries are not uncommon in Great Britain, still the majority of shops producing light castings, are by no means using advanced methods. One very often finds shops using small iron flasks not more than 5 inches x 12 inches in size, the molder working ungated patterns and being compelled to draw each of these separately, even when such castings are being made in considerable quantities.

While our English brothers are somewhat slow and conservative in adopting new ideas, still, a very fair number of molding machines have been installed in that country and good results are being obtained from these. In many cases it has been necessary to have patterns regated, and bringing them closer to one another; again snap flasks have been introduced and the number of castings contained

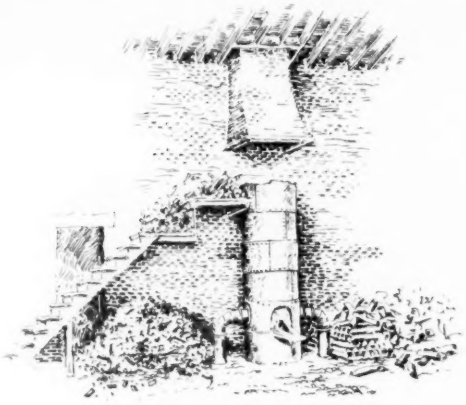
CUPOLA IN USE THROUGHOUT THE MIDLANDS OF GREAT BRITAIN.

in each mold increased, the gain in production from this source amounting to between 20 and 65 per cent. In some of these shops where molders formerly received 2 shillings or 48 cents for molding 100 pounds of castings, the introduction of the molding machines has reduced this price to 1 shilling and 6 pence, equivalent to 36 cents for the same amount of castings, and yet the molder is at the same time earning about 25 per cent more money than by the old methods of working, and is also producing castings of far superior quality.

Another feature in which there is a great difference between the foundries of the United States and those of Great Britain is in the size of shops in the two countries. In America the majority of the foundries, devoting themselves to the manufacture of light castings, employ a large number of molders, while in Great Britain the reverse is the case. As a typical illustration of this I noticed in a certain town in the Midlands a large gateway entrance and an imposing sign containing the words "General and Malleable Iron Founder," which gave me hopes that this was a place which I might enter and possibly there do some business. Imagine my surprise when I found that the proprietor was making his own molds, mixing his own metal, and producing castings by the crucible process, the finishing, packing, etc., being done by his wife and two daughters, these four comprising the entire force of employes. This is an extreme case and I have no intention of conveying the idea that this is at all representative of English foundries.

In regard to the labor question an essential difference exists between the common practice in America and England. Undoubtedly the labor generally employed in English foundries is considerably cheaper than that to be found in America. I came across a case where a boy 14 years old was working for a molder at the rate of 1 shilling and 2 pence per day, equivalent to 28 cents and in numerous instances full grown men working 54 hours per week, earning in that time from 22 to 28 shillings or from $5.50 to $7.00. I am convinced that when these foundries adopt modern appliances, such as hand molding machines for light castings, which require no large outlay of capital, that they will be in position to offer serious competition in this branch of the trade.

Many of the foundries connected with engineering works throughout Great Britain are



A BELGIAN CUPOLA.

so equipped that they can turn out work to the best advantage, and as a result one finds in these electric cranes, suitable iron flasks, drying ovens, etc. In many of these foundries, castings are not made in large enough quantities to warrant the expense of special pat-

terns and molding machines, and so little improvement can be made along these lines, while in America, work in all branches of the foundry trade is being so standardized that improved methods can be adopted.

The Ley's Malleable Casting Co., Ltd., of Derby, and Harrison & Co., of Lincoln, are the largest and most up-to-date malleable iron foundries making light castings, and both of these have adopted American methods of molding. The plant of the former covers 11½ acres while the latter concern is about to erect another large foundry.

Another important feature in which I noticed a considerable difference between the two countries is in cupola practice. The halftone illustration accompanying this article gives one a fair idea of a cupola in common use. A large number of these are to be found in small foundries throughout the Midlands. The elevator is used but little, iron and fuel being

TYPE OF CUPOLA USED BY A FOUNDRY IN PARIS, FRANCE.

carried out in boxes to the charging platform, which has no overhead protection, the necessary work having to be done outside in all conditions of the weather. In some cases even the cupola charging door is dispensed with, the material being thrown in at the top of the stack.

I also show with this an illustration of a type of cupola to be seen in use in Belgium, and another cupola which is at the present time being operated in Paris, France. The latter cupola resembles a brick smoke stack, the top being bricked over solid. In order to provide an opening, beginning within a few feet of the top of the stack about every fourth brick is omitted. When I saw it in operation at melting time a stream about the size of ones little finger was pouring forth from the tap hole.

Curiously enough one finds somewhat of a difficulty in gaining entrance to these foreign foundries, especially in Belgium and France. In one of these places the owner of the shop was very much interested in molding machines, but would not allow the writer to enter the foundry in order to observe the conditions prevailing there, or the class of work being done. Instead I was asked to call at another time, and when I done so, to my surprise I found on entering the office, that the floor of same was covered with a sample of each of the castings being made. The founder went into the matter of output very carefully, and after he had taken several weeks to decide, finally ordered one machine, amounting to $55.

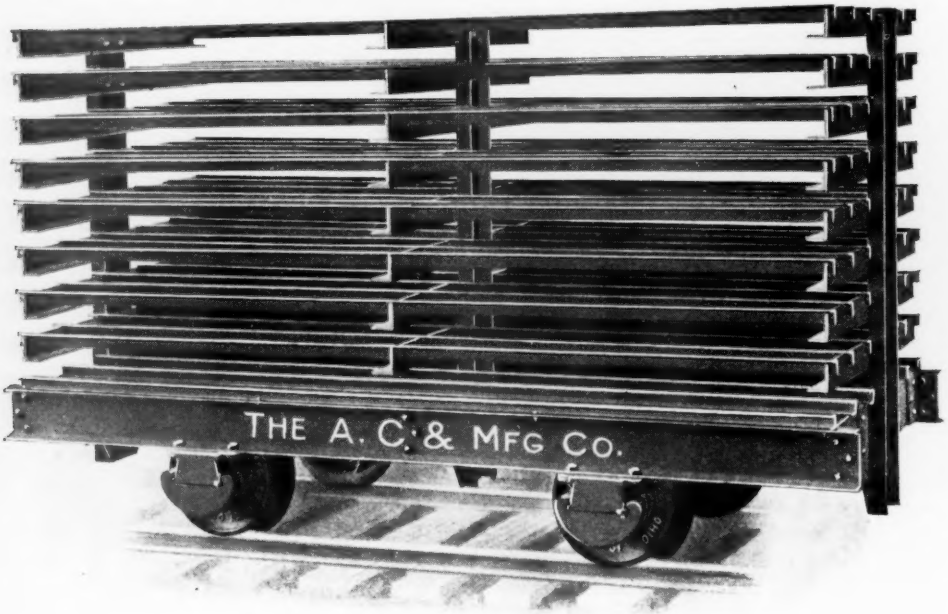
The Belgian molder while at work in the summer time, seldom wears anything but trousers and wooden shoes. At molding some of them even work barefooted, wearing their wooden shoes only while pouring off. The type of shovel they use is a very poor excuse of a tool. The blade is rounded off at the front, a straight stick being used for the handle, all of which must be very cumbersome to work with. While it is true that all of these old methods tend to lessen the output per man, yet it is difficult to make the people see that such is the case or to convince them that a change for the better should be made. During my trip I noted that a great deal of the small wrought iron chain is being largely made by women and their children. The work-shop adjoins the kitchen. Here they work at the anvil and forge and become expert blacksmiths in this particular line of work.

The National Malleable Casting Co., whose general office is in Cleveland, with works at Cleveland, Chicago, Indianapolis and Toledo, has purchased in Chicago the plant formerly known as the Grant Locomotive Works, and will convert the property into a malleable iron foundry. The 10 buildings comprising the plant occupy a 28-acre tract of land, extending from 13th to 16th street, and lying between West 52d and 53rd streets. The conversion of the plant for foundry use will occupy some time and it will probably be three or four months before the first casting is made. In addition to the plant proper the National Malleable Casting Co. has purchased for $20,000 a 9-acre tract of land just north of and adjacent to the property. The Grant Locomotive Works was established several years ago, and have been remarkable principally for the number of times the property has changed hands.

ATLAS CORE OVEN CAR FOR LARGE CORES.

Atlas Core Oven Cars.

The Atlas Car & Manufacturing Co., of Cleveland, O., are making a specialty of building core oven cars for all classes of cores. Our first illustration shows a recently designed core oven car manufactured by this company which will appeal to the trade both on account of its strength and practical construction. Being made of steel the car can be constructed so as to comprise a minimum weight with the maximum amount of strength. As will be noted in the illustration the car is fitted with two removable steel decks, allowing for the drying of larger cores than could be accommodated in the spaces between the decks. 12-inch wheels are used having roller bearings within the hubs. These rolls are of cold drawn steel and a car equipped with these bearings can be operated with the greatest



ATLAS CORE OVEN CAR FOR SMALL CORES.

case. While the Atlas Car & Manufacturing Co., has endeavored to establish a standard line of cars including all types which they build, it has in many instances found it necessary to conform to special designs and ideas advanced by prospective customers. While the car illustrated is intended to be used with a standard track gauge of 36 inches it can be built to meet any requirement either as to gauge of track or other dimensions.

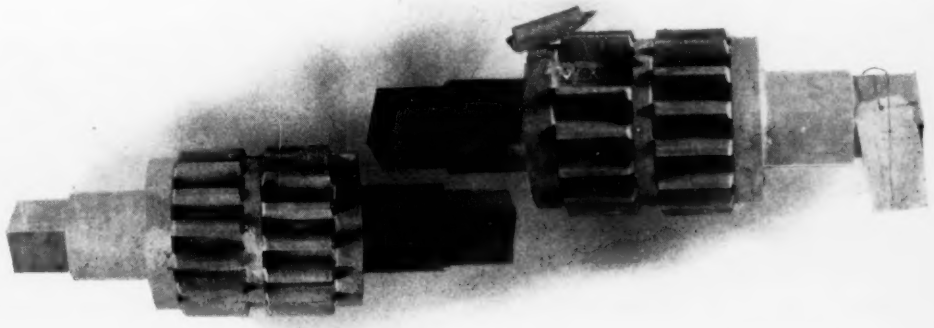
Our second illustration shows another core oven car made by the same company which is intended more particularly for the drying of small cores and has a series of racks running longitudinally which are capable of holding a large number of small cores. As is the case with the car shown in the first illustration the deck slats can be readily removed for the drying of larger cores if desired. The cars are fitted with chilled wheels and the bearings consist of self aligning cage rolls, which is an entirely new departure from the plain roller bearings. They are designed to adapt themselves to the expansion resulting from the excessive heat to which the cars are subjected in the ovens, and in addition to this feature, vibrations due to inequalities of track are absorbed through this medium. The journal boxes are made with an oil receptacle for the purpose of keeping the bearings constantly oiled.

In addition to manufacturing core oven cars the Atlas Car & Manufacturing Co. also turn out a complete line of cars, switches and frogs for use in all manufacturing industries. Special attention is given by this company to designs required to meet peculiar conditions in any line.

Brazing Cast Iron.

As a rule the foundryman's method of repairing a broken casting is to melt it over and make a new casting. Sometimes the damage may permit it of being patched together by the machinist, and again burning is resorted to, as in the case of rolls and like castings, upon which considerable machine work has been expended. Of course no one will deny that it would be a nice thing to be able to braze a broken casting together even if this would only hold temporarily while a new casting is being made. Undoubtedly many experiments have been made in this direction, at times when a small part of a casting has been broken off, but as far as we know these attempts have not resulted in any permanency of mending breaks in cast iron.

The American Brazing Co., of Philadelphia, have been organized to introduce a method of brazing cast iron, the invention of a German, and we understand that it is proposed to establish repair depots in the leading centers, as well as to dispose of the right to use the process to individual establishments. We have before us a piece of a casting, three-eights of an inch in thickness which has been brazed together by this method, and while we have not at our command the means for applying a very destructive test, we have given it something of a hammering without succeeding in separating the brazed joints, although the casting has broken at other points.

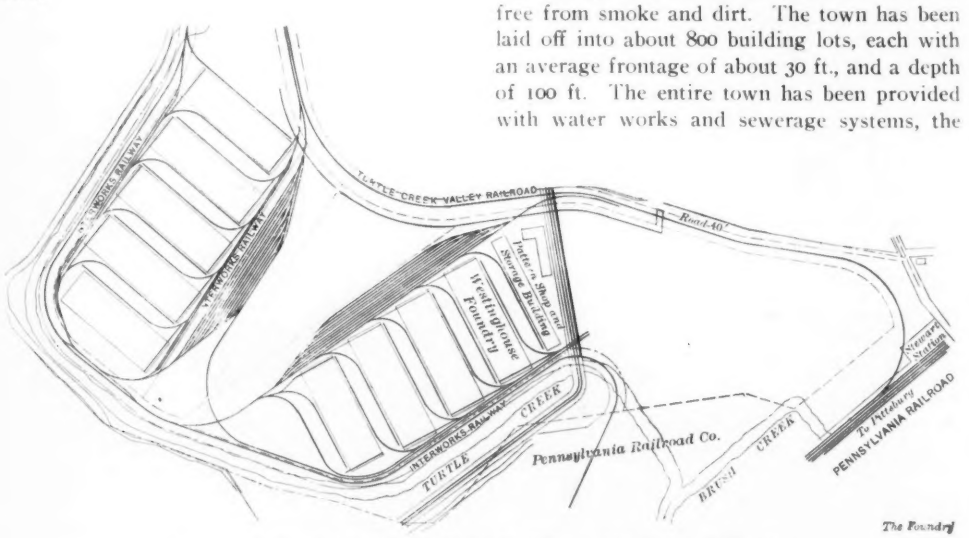


BRAZING THE TOOTH OF A PINION.

We are advised by the American Brazing Co. that they are in a position to demonstrate the efficiency of their process of brazing cast iron at their shop, 225 South Fifth street, Philadelphia, and we believe they also invite samples

of broken castings to be repaired as a test. They say that of a great many pieces which have passed through their hands within a short time they have not came across one which failed to hold at the brazed joint, although repeated tests have been made which caused the casting to break elsewhere. As a fine piece of work the American Brazing Co. point to a needle brazed together so that the joint is not noticeable to the naked eye.

We append an illustration of a heavy pinion showing its appearance before and after being repaired by the American Brazing Co. The design of this casting shows that it is subjected to exceptionally severe service and we are informed that since the tooth was brazed in its original position the casting has been in use for several weeks without giving the least indication that the repair is not permanent.



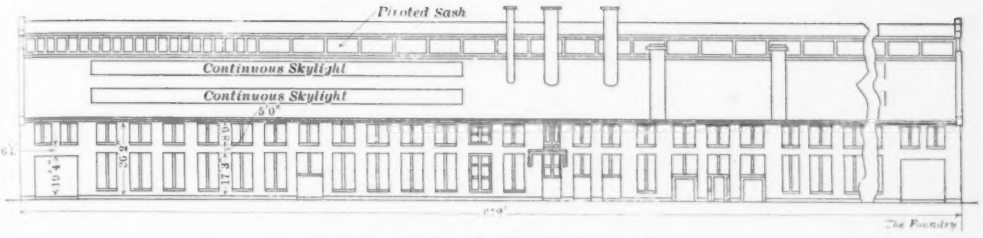
MAP OF THE NEW WESTINGHOUSE PLANT AT TRAFFORD CITY, PA.

The New Westinghouse Foundry at Trafford City, Pa.

The growth of the affiliated Westinghouse industries has been emphasized by the creation of a city and the building of another Westinghouse manufacturing plant. The new industrial center is located about 17 miles east of Pittsburg on the Pennsylvania Railroad and is to be known as Trafford City. Extensive factory sites have been laid out here to provide for the overflow of the several Westinghouse industries, a number of which have already used up all the available building room at their present locations and are still pressed for space. The first of the Westinghouse companies to erect buildings in the new city is the Westinghouse Foundry Co., which is at present putting up the extensive foundry plant and pattern shop described in this article. This addition is necessitated by the rapidly increasing business of the Westinghouse Machine Co., especially in connection with very large steam and gas engines and steam turbines.

In laying out Trafford City provision has been made, not only for the factories that are to be erected there, but also for homes and all modern improvements and comforts for the men who are to work in the factories. The latter will be located on a fairly level tract between the Pennsylvania Railroad and the residence portion of the city, which will be reached from the railway station by a steel viaduct 1,100 feet long. The residence district has been laid out upon hillsides and a generally level plateau, high enough above the factory sites to render it free from smoke and dirt. The town has been laid off into about 800 building lots, each with an average frontage of about 30 ft., and a depth of 100 ft. The entire town has been provided with water works and sewerage systems, the latter including separate storm water and sanitary sewers. This work, as well as the paving of the streets, was completed before the city was thrown open to settlement. The latter event, which took place on June 7, 1902, recalled in many ways the famous booms of the far West. Many of the intending purchasers of the lots came to the site of the future city a day before the sale was to commence and "squatted" on the ground which they wished to possess.

The new town is connected with Pittsburg by the Pennsylvania Railroad, over which there are 46 local passenger trains going each way daily and reaching the center of the city in

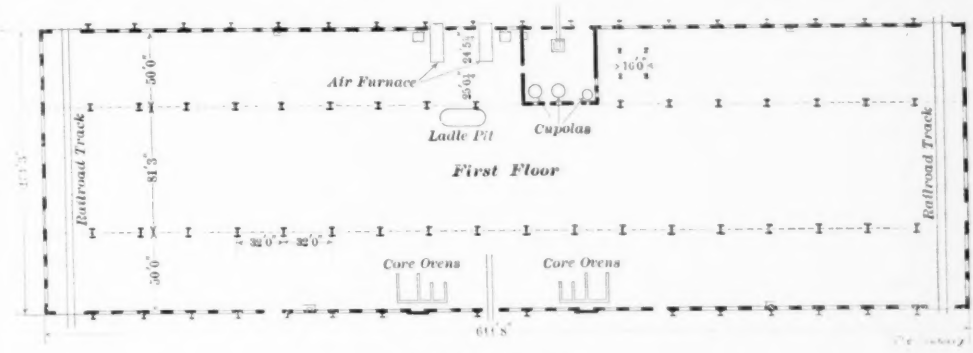


NORTH SIDE ELEVATION OF FOUNDRY.

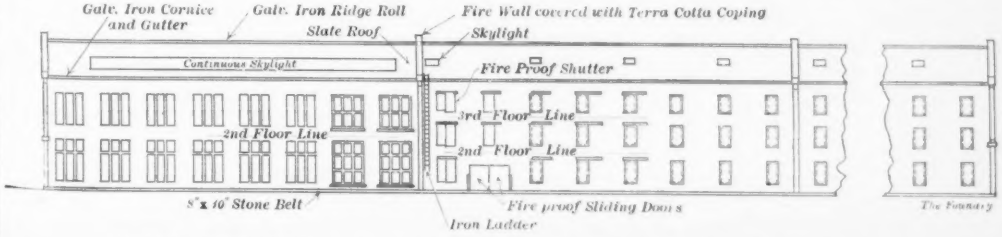
from 25 to 35 minutes. In addition a street railway line has been built, connecting with the Pittsburg Railway Co.'s line at Wilmerding, 2½ miles distant. This street railway passes over the street viaduct into Trafford City and forms a loop through the principal streets.

The factory site, located in a bend of Turtle Creek, provides room for nine factory buildings, each about 200 ft. by 800 ft. A system of railway yards and tracks serving this area has been laid out in a very thorough manner, providing a track alongside of each building and transversely through each end. The storage tracks, in connection with this, occupy an area of about 300 ft. by 200 ft. This system of tracks is connected with the main line of the Pennsylvania Railroad by the Turtle Creek Valley branch of the latter. It is also to be connected with the towns of Wilmerding and East Pittsburg, where the works of the Westinghouse Air Brake Co., the Westinghouse Electric & Mfg. Co., and the Westinghouse Machine Co. are located, by an inter-works rail way which will be operated by the Westinghouse interests.

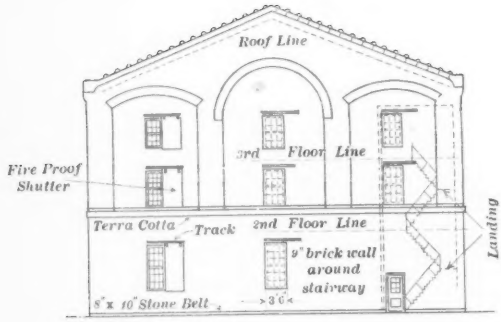
The new foundry and pattern shop of the Westinghouse Foundry Co., are located at the extreme southern portion of the factory site and near the steel viaduct mentioned above. The pattern shop and storage building, which has already progressed well toward completion, is a steel and brick structure 605 ft. long and 80 ft. wide, with a height to the eaves of the roof of 47 ft. The pattern shop occupies 160 ft. at one end of this building. It is divided into two floors, the second floor being suspended from the roof trusses in order that the first story may be entirely free from columns, thus providing ample space for handling the largest patterns. The remaining 447 ft. of the building



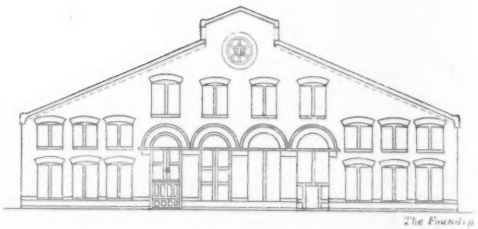
PLAN OF FOUNDRY.



NORTH SIDE ELEVATION OF PATTERN SHOP AND STORAGE. LENGTH, 605 FEET.



EAST END ELEVATION OF PATTERN STORAGE.



ELEVATION OF EAST AND WEST ENDS OF FOUNDRY.

is to be used for the storage of patterns and has three floors, the two upper floors being supported on steel columns and the entire space being divided by interior fire walls into three separate compartments. The foundations are of concrete and the superstructure of steel and brick. The foundation of the ground floor is made up of 8 inches of concrete into which the floor sleepers are bedded and on top of these is a layer of 2-inch maple flooring. The upper floors in both the pattern shop and storage building are supported on steel beams and steel girdings, and are made up of 3-inch yellow pine flooring covered by one thickness of maple flooring. The roof purlins are steel I-beams spaced 8 feet center to center, and covered with 3-inch roof sheeting which is covered with slate.

The foundry building is 611 ft. 8 in. long and 184 ft. 3 in. wide outside of the brick walls, which are 36 ft. high at the eaves and 80 ft. at the peak. As in the case of the pattern shop, the foundations are built of concrete and the superstructure of steel and brick. The foundry is divided transversely into three bays, the center bay being 80 ft. 3 in. wide between centers of columns, runways being provided for traveling cranes of 80-ft. span and 150 tons lifting capacity. The cranes will be electrically driven. The two side bays are each 50 ft. 6 in. wide from center to center of columns and are provided with runways for traveling cranes of 47 ft. 2½ in. span and 50 tons lifting capacity. At one side of the foundry building runways are provided for yard traveling cranes of 100-ft. span and a lifting capacity of 75 tons. The I-beam purlins are spaced 8 ft. center and center and are covered with 3-in. yellow pine roof sheeting. The roof is covered with slate.

At the middle of one of the side bays, where the cupolas are located, is a charging floor about 50 ft. square, constructed entirely of steel. The melting equipment of the foundry will consist of two air furnaces, each having a capacity of 30 tons, and three cupolas capable of melting 18 tons per hour each. This will enable a casting weighing as much as 100 tons to be easily poured and the casting can afterwards be lifted out of the sand by one of the 150-ton traveling cranes. The air furnaces will be employed for the largest and most important castings, owing to the fact that they yield a superior iron, and the cupolas will be employed for the ordinary classes of castings, and particularly small castings. The building will contain every modern foundry convenience, making possible the easy and economical handling of all materials, and it is expected to produce such castings as those required for the largest size of steam engines now in existence, with provision for possible increase in sizes for the future. Both buildings will be provided with automatic sprinklers for fire protection.

The buildings will be equipped with modern lavatories and conveniences for the comfort of workmen and will be in every respect up-to-date. They will be heated by hot air, the foundry, pattern shop and pattern storage rooms to have minimum temperature of 50, 60 and 35 degrees Fahr., respectively, in zero weather. Artificial light will be furnished by both arc and incandescent lamps. In order to insure plenty of light during the day, the windows are large and both the foundry building and pattern shop are provided with sky-lights of large area.

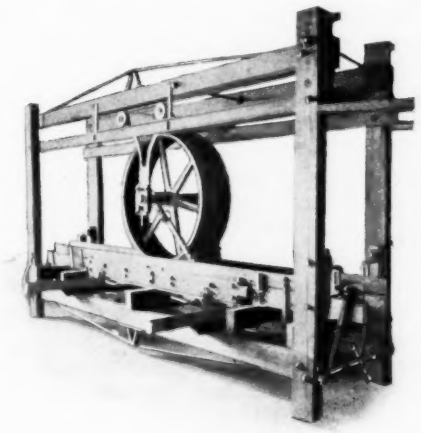
M. Buhler's Sons, of New York City, have made an assignment for the benefit of their creditors. The business was established many years ago by Mr. Buhler, who died in 1887.

The Ideal Foundry Co., of Ashtabula, O., will enlarge its plant.

Paul Opocensky will establish a small foundry at Cuba, Kansas.

An Odd Molding Machine.

We show with this an illustration of an odd molding machine, or rather a contrivance for compressing the sand in molds, designed by Mr. J. B. Rufe, of Lansdale, Pa. It does not ram the mold, as this is generally understood, but instead, squeezes the sand together through the medium of a wheel, which is rolled over the flask after this has been filled with sand. The wheel used on the machine shown in the illustration weighs 400 pounds, though the actual weight of the wheel has but little to do with the pressure exerted upon the mold,



THE RUFE MOLDING MACHINE.

since this is regulated by means of coiled springs bearing upon the boxing of the journals of the wheel shaft and controlled in its compression by bolts. The heads of the latter are secured in the hangers, and passing through the springs are provided with nuts which bear upon the lower end of the springs.

The construction of the Rufe molding machine is clearly shown in the illustration, the framework being brazed to withstand the strain incident to forming the mold. The wheel is suspended in hangers, its shaft being journaled in the lower end thereof while the upper end of the hangers have grooved rollers journaled upon them, the rollers traveling upon tracks secured to the side bars. Two V shaped tracks are provided upon which the grooved matchplate, or a follow-board having grooves to correspond thereto, rests. When the flask has been placed upon the matchplate, both are slid under the machine, where a supplementary set of side bars are lowered over the flask to permit of an even level of sand being maintained above the height of the flask. This is necessary as a certain volume of sand must be allowed for compression and to secure uniform density the loose sand must be distributed evenly over the mold. With the flask shown in the illustration the sand is compressed about 1¼ inches in depth. The amount of sand used in a mold is regulated by an adjustable gauge, which travels upon the side bars in advance of the wheel, striking off the surplus sand, so as to give the required volume, which depends upon the size of the flask, its depth and the density desired.

When the flask has been filled with sand the wheel is passed over it once and remains at either end of the machine until another flask is ready. The side bars are raised by means of a lever a sufficient distance to clear the flask, when the latter together with the matchplate is pulled out on the V tracks. Removing the flask from the matchplate also at the same time separates the pattern from the mold and leaves this ready to be placed upon the floor. The matchplate shown in the illustration is 6 feet 3 inches long, the machine being principally used for the molding of soil pipe. It is evident that the width of the wheel is regulated by the width of the flask. Sewer traps 17 inches wide and 2 feet 5 inches long by about 5½ inches deep have been successfully molded on this machine.

Shall the Riser be Open or Shut?

This question has been brought to my notice in so many ways that I am tempted to place before the foundrymen my views on the subject and my reasons therefor, and trust that this may be but the beginning of a discussion of a feature which is of far more importance than is generally acknowledged.

I have made it a practice to keep all risers uncovered during the pouring of a mold and have done so with the very best results during the last eight years, in which time I have made castings in loam, dry and green sand, weighing from a few pounds up to 50 tons. I contend that to close all risers previous to pouring iron into a mold not only harms the latter but also injures the casting and that no good is accomplished by following this method.

When melted iron is brought into contact with a mold gases are formed, which, upon finding an outlet from the mold, burn with a blue flame, commonly called the vent. Every foundryman knows that when iron is poured into a mold gas is made and he also knows

that if there are not sufficient means provided to convey these gases from the mold in the shortest possible time that these will accumulate inside of the mold and make themselves known in no uncertain manner. Then again, it seems reasonable to suppose that unless the gas is conveyed out of the mold as fast as it is made that more or less of it will be mixed with the iron, and that unless this is sufficiently hot to allow the gases to be liberated, air holes in the casting will result.

Any foundryman may test the truth of this by pouring two similar molds, one with the risers open and another with these closed. Let him have his iron cooled down, though not too dull and if he will watch the results in the machine shop, when the upper surface of each casting is planed, he will soon learn that the casting which is poured with the risers closed will have more or less air holes in its surface, while the one poured with open risers will come out perfect.

I know that a great many foundrymen will say that the gases will easily find their way through the sand of the cope or wherever vents have been provided at the joints of the mold or through a cinder bed, but I contend that to get as perfect castings as possible, these outlets are not sufficient. To prove this, open the riser when a casting is being poured and a flame, in some cases 2 or 3 feet long, shoots out. If the outlets as originally provided without leaving the riser open was enough, no one would expect to see such a display of flame. In talking over this subject I have been told that an open riser acts like a chimney, but I doubt that it will take a practical foundryman very long to learn that there is something else at work besides a draught. Put a piece of wood, or some other light substance, over a riser before commencing to pour and usually it will be forced off long before the mold is filled to the top, showing that considerable pressure exists within the mold which should be relieved.

If the sand of the cope, and other channels provided for the escape of the gases generated, were sufficient the presure which we witness would not be seen in all foundries casting their molds with open risers. My reason for believing that open risers are the best and safest practice from several points of view is that I have found castings to be more solid when the risers were kept open, as all gases accumulating while filling a mold are removed before the iron touches the cope. If we close the riser we place an enormous pressure on the molten iron running into the mold which causes what is commonly known as back pressure. Again, by keeping the riser open we reduce to a minimum the pressure on the mold and prevent the steam being generated from collecting on the cope and falling upon the iron where it causes a thin skin to gather on top of the iron. Among other evils which an open riser will prevent is what is called dumb scabs, and dirt collecting two to three inches from the joint, giving the casting the appearance as if the sand had been wet or the cope had been rammed too hard. The latter is very often pronounced as the cause for defective casting, when, if the mold had been provided with sufficient risers, these marks would have been missing.

In writing on this subject I am chiefly referring to heavy castings, although small work is affected after the same fashion, with this difference that as the molds are more quickly filled the attending evils are less noticeable, but none the less prevailing. We all know that old argument about draw-downs being due to open risers, but I oppose this theory every opportunity I have to do so. To support my views I will state that I have cast a mold 30 feet long, 7 feet wide, filled with ribs running its full length. This plate had 22 risers, all open, and not a cubic inch of sand was drawn down, and this was a green sand mold, too. I have made hundreds of just such large pieces as well as gears, flanged top and bottom, with teeth of 5 to 6 inches pitch and 20-inch face, molding these in green sand, and when pouring the mold a flame about 3 feet long would be coming out of the six risers, and yet the teeth would show up first class.

I could quote innumerable instances in support of my theory that the proper way to pour a mold is with open risers, but I know that there are large numbers of foundrymen who oppose these views, and such now have a chance to uphold their hobby of putting clay, paper or a plate over a riser to keep the cope from drawing down or the mold from scabbing. If there is anything to their pet theories it is time we ought to know it.

A. M. LOUDON.

O. D. Bleakley has been appointed receiver of the Grant Tool Co., Franklin, Pa. The plant will continue in operation under the present management.

The Alger Iron Foundry Co. has been organized with a capital of $10,000 to do business at West Bridgewater, Mass.

Curiosity Shops.

On a recent trip westward I had occasion to stop off at a little town in Nebraska, and having some time to spare I was agreeably surprised to see a cupola stack sticking through a roof, a sure sign that a foundry was there. Going over that way I entered by the front door, which proved to be the office of the plant. It was about 5 P. M. and the force of three men had quit for the day. One of the proprietors was sprawled out on a bench near an open desk, his head resting on his hand and elbow. He had a pipe in his mouth and greeted me with a howd'y, as he spit without removing the pipe or moving himself; the other proprietor was busy filing a saw, but he looked up and gave me a nod. While conversing with the gentleman, who was taking it easy, about conditions of the trade, I took a general survey of the surroundings and found it to be a machine shop, office and lounging room combined. A big stove was close by, while a circle of chairs and boxes serving for seats were all around it, giving the place the appearance of a country store, and the spittoons looked like they were working overtime, and from this condition I inferred that castings were made while one waited. To the right of the desk and on top of a barrel was a bell of the kind and size which is generally used in boarding houses to call the guests to meals; this was used to start and stop the force.

I could not help but remark how industrious the owners of this shop appeared to be when I noticed an incubator there which was part of the office equipment. It was not in operation just then but I was given to understand that it would be later on, it being a little out of order and in need of repairs. The business of founding and chicken hatching have gone hand in hand for some time in the far west. The latter is an industry which our progressive eastern foundrymen seem to have entirely neglected, and there are undoubtedly some shops in that territory to whom it would be welcome.

Having heard so much about the great McCormick Reaper Works, of Chicago, and never having had the chance to see for myself what they looked like, I resolved to pay them a visit. On arriving at the gate a watchman asked me the nature of my business, then looked over a requisition list, which was supplied him from time to time, and advised me that no molders were called for that day, but permitted me to enter the office, where the man in charge sent an escort to accompany me in search of the foreman. This individual led the way until we came to a certain building, when we started going upstairs from one floor to another, and I noticed that the higher we went the more distinct became the smell of foundry smoke until when the fourth floor was reached we were face to face with the foundry. The party who had me in charge led me from one place to another inquiring for the foreman, then started up another flight of stairs and here was another foundry on the fifth floor. This was the first time I had ever come across foundries piled on top of one another and the arrangement of these shops was quite a contrast to a great many Chicago foundries which are located in the cellars of their respective establishments.

When we found the foreman I learned from him that he was as busy as could be and could use more molders if he only had a place to put them. He asked me to call again and altogether I was quite impressed with what I saw of the works. The foundries are, of course, of large proportion, employing a great number of men. I noticed that in both foundry departments the floors were full of machines. When about to leave the shop I was accosted by one of the molders who knew me and who asked me to wait on the outside until he was through, which I did, when we adjourned to a nearby resort for tea, and my oldtime acquaintance amused me for nearly two hours. Said he: There are only six of us on the fifth floor who can speak English, by this I mean that the operators of the molding machines are all Polaks and can speak English in broken doses only; it is all agricultural castings and they work by the piece and do fairly well, but some of them are at work at 4 A. M. The shop does no outside jobbing work, but keeps several men busy getting out this class of castings for their own use. The machines are a success on that class of work and very nice work some of it is to mold. The blast goes on early in the morning and casting is done very nearly throughout all of the day. The molders mold a while, then take a rest, when they cast a while. They all get through early and jobbing molders and all are out by 5 P. M. When through, each man, piece workers, laborers, and all must procure a pass before they are permitted to pass out of the gate.

There is another foundry operated in connection with this plant, situated on the lower floor, the dimensions of which are something enormous, there being no less than four cupolas located in this one building to do the melting. It, too, is filled with molding machines,

the operators of which belong to the same class as those of the foundries previously referred to. The mere fact that six cupolas in all are required to do the melting for this concern will give one an idea of the number of men required to do the molding, especially so if it is taken into consideration that the castings are nearly all of a light character and that the cupolas are melting nearly throughout the whole day, and not an hour or two in the evening, as is the case in ordinary foundries.

A. L. RICHARDS.

Some Interesting Alloys.

Alloys in some cases bear out the properties of their component metals, but this is very often not the case. Zinc and aluminum are both very soft metals, yet an alloy of aluminum four parts and zinc nine parts is very hard and tough, and a slab of such metal 3/8 inch thick will resist a good hard blow of a 7-pound hammer, which shows a considerably greater resistance than cast iron would under the circumstances. A strange mixture discovered by accident having the composition—lead 66.89, copper 11.32, tin 10.52, antimony 3.70, iron 0.75, silicon 2.09, sulphur 0.53, is found to resist the attack of boiling strong sulphuric acid, hydrochloric acid hot or cold, and only partially dissolved by hot nitric acid; an alloy which has been recommended for laboratory fittings on account of its permanence contains copper 15, tin 2.34, lead 1.82, antimony 1. A very curious alloy of nickel and aluminum containing about 4 per cent of nickel has been found which, in a few hours after being cast, falls to powder at ordinary temperatures.

The alloy called magnalium is made of aluminum containing from 10 to 25 per cent of magnesium. It is exceedingly light and volume for volume is cheaper than brass; it melts under 800 degrees C., and is therefore easily made; it is almost as white as silver, and hard enough to cut aluminum; as regards its general characteristics, with 10 per cent of magnesium it resembles zinc, with 15 per cent magnesium it is similar to brass, and with 25 per cent magnesium like a compound bronze. It does not file as easily as brass, but more readily than copper, zinc, or aluminum.

An alloy having a great resistance to saline liquids, and therefore well adapted for cooking utensils, fittings, etc., contains: manganese 4.06, copper 53.61, zinc 41.10, aluminum 1.23; this metal is also very ductile.

As many probably know, the addition of molybdenum (about 0.2 to 0.3 per cent) to steel containing 0.2 to 0.3 per cent of chromium, greatly increases the hardness of the steel without making it brittle; with a little carbon, this alloy, after heating to 300 degrees C. and chilling will scrach glass.

R. O. BROWN.

Cast Iron Pipe Inspection.

City Engineer d'Hemecourt, of San Diego, Calif., was held up by a reporter for the *Tribune* the other day and made to disgorge some information as to the methods in use for testing cast iron pipe. According to his story the inspector must be a most wonderful man, as he is given credit for knowing a great deal about the foundry business that never occurred to the foundryman, as will be seen from the following:

"The inspector who is at the foundry knows what iron is being used. He knows the characteristics of all of the iron in the part of the country in which foundry is located, and from which it draws its supply of pig iron. He knows how these different irons combine to make the best castings, and he has various tests to apply at various stages of the work.

"When a cupola of the iron is ready to run off, he is informed as to what sorts of pig iron have been put into the same, and therefore knows what sort of a casting is likely to come from it. If he considers it advisable, he will make a chemical analysis of the mixture. At any rate, he will take a ladle full of the molten iron and cast a bar 2 inches wide by 26 inches long, and 1 inch thick. This bar is carefully cast, and very carefully tested. Its deflection is noted and then it is tested until it is utterly destroyed. The breaking strain is also noted. If either the deflection or the breaking strain do not come up to the proper standard, the foundrymen are not permitted to cast the pipe from that batch of metal. It will have to be brought up to standard or possibly it might be used on some piece of work on which there was no inspector at the works.

"When the molten mass is pronounced all right, the castings are made. The molds stand upright with the bell end to the bottom. When cast, the inspector is present, and it is his word which says when they shall be taken from the molds. As they are taken out, there is another inspection at which the hammer test is applied. The inspector has a 3-pound hammer with a handle 16 inches long, and he is able to discover defects with it. He also makes examination of the pipe itself to see that it is

sound throughout and to see that the mold was properly made and properly filled."

If the inspector is such a smart chap and knows how different irons combine to make the best castings, it seems to us as if he ought to be given charge of the cupola. The mere fact that he can discover defects with a 3-pound hammer having a 16-inch handle proves nothing. Most any instrument will do this. Some molders are in the habit of locating defects in castings with their fingers, just to be sure their eyes do not deceive them.

The Sand Blast for Cleaning Castings.

At a recent meeting of the Philadelphia Foundrymen's Association, A. G. Warren, of the J. W. Paxson Co., said that although it has been many years since the sand blast was brought to public notice it is only within the last decade that its utility has been appreciated by foundries. The improvements made in air compressors and the more general use of compressed air, have, in a large measure, been responsible for this. It is not until comparatively recently that there has been on the market an efficient American built sand blast machine. The machine itself should be strongly built, to stand rough usage of unskilled labor. As damp sand will clog up any sand blast, hand holes should be so located that the obstruction can be removed at once without much trouble.

An important point not to be overlooked is the quality of sand which should be used in these machines. It should be hard and tough and not too fine, and thoroughly dried and cooled before using, so that it will not steam and clog up the machine. Care should be taken not to overheat the sand, for this will cause it to break up, and a good deal of its efficiency is destroyed. To avoid trouble, it is necessary to have a good air compressor. The idea that because only a low pressure is used any old machine will do is a wrong one. The compressor selected should have a confined suction, so that cold air can be supplied to it and thus avoid taking in more moisture than necessary. It is a well known fact that cold air carries less moisture in suspension than hot air. The receiver should be located near the sand blast in order to trap out any moisture that may condense in the pipe. Either a belt or steam driven compressor may be used, as best suits the power condition of the plant where it is installed. Where there is ample engine power available it is best to use a belt driven compressor, because a large engine uses steam more economically than a small steam driven compressor. The best place to locate the air compressor is in or near the engine room, so that the engineer can take care of it. With the proper size of pipe air can be conducted a long distance with very little loss in pressure. The number of cubic feet of free air required per minute will vary according to the opening in the nozzle and the pressure required to do the work. For brass castings 10 pounds pressure is sufficient; on gray iron castings 15 to 20 pounds is generally used; and for steel castings 25 to 30 pounds is required. Experience has proved that a large amount of air at a low pressure will do more work than a small amount at a high pressure.

It quite frequently happens that an establishment having a high pressure air service already installed will consider the advisability of putting in a sand blast plant. One of the first questions arising is whether the high pressure air can be reduced. While this can be done it is not economical. Take, for example, a sand blast for cleaning gray iron castings, using air at 20 pounds pressure, through ½-inch nozzle, the amount of free air required would be about 120 cubic feet per minute. To compress this amount to 20 pounds requires about 9 horsepower. To compress the same quantity to 80 pounds would take about 23 horsepower. As there is no power or advantage gained by reducing, there would be a loss of about 14 horsepower, and the total loss for a year would amount to nearly the cost of a special compressor for this service.

As the sand blast makes a large amount of dust it is customary in most cases to have it installed in a room by itself, of sufficient size and conveniently arranged to handle the work. In all cases it is advisable to use an exhaust fan to take away the dust. The size of fan will vary according to the size of the room, size of sand blast and amount of dust to be exhausted. It is better policy to install a large fan and run it a medium speed than to run a smaller fan at a high speed to do the same work. While the first cost may be a little more, the difference will easily be made up by the horsepower saved. Where it is objectionable to exhaust the dust out doors it becomes necessary to install a washer that sprays the dust as it is drawn through, so that the exhausted air is practically clean. The dust settles to the bottom of the washer as mud, and occasionally has to be shoveled out.

Where the sand blast is used on a large scale it is an advantage to have an arrangement for preparing sand so that it can be used over and over. In this case a hopper is located in the center of the room, or to one side, and covered with a grating. The hopper discharges into an elevator boot, from which the sand is elevated and fed into a revolving screen, where the fine sand is screened out into a dust box and the tailings fall into the sand box, which is above the sand blast. From the sand box the sand is fed back into the sand blast as required. With this scheme the fine sand does not get into the washer or fan, consequently the washer does not have to be cleaned out as often. The belt elevator is a positive device, and when it is properly fed gives good satisfaction. As the conditions in any two plants are never exactly alike, it requires considerable thought to get the best arrangement and one that will give the best satisfaction.

For cleaning large amounts of small castings a sand blast tumbling barrel is used to advantage. Capacities of these barrels vary from 5 to 10 tons per day. The barrel, mounted on rollers, is filled less than half full and caused to revolve very slowly, say three or four revolutions per minute. The sand blast jets are introduced through the ends of the barrel, and as the barrel revolves each casting comes in contact with the blast. The time required to clean one charge varies from 20 to 30 minutes. The advantage of this method is that the castings are thoroughly cleaned and the sharp corners preserved. The barrel itself is covered with a sheet iron casing, which is connected to an exhaust fan and washer, if necessary.

In comparing the sand blast process with other methods of cleaning it is unfair to make comparisons with methods where the castings are only half cleaned. In the bathtub business the sand blast is almost an absolute necessity on account of the labor saved, and because it is the best way to prepare tubs for enameling. On castings to be machined there is a great saving on the tools in the machine shop. The sand blasted casting takes paint better and has a more finished appearance than a casting cleaned in any other way.

The Morgantown Machine & Foundry Co., of Morgantown, W. Va., has been formed with $50,000 capital for the purpose of operating a foundry and machine shop. E. M. Grant, Anton Roemisch, H. J. Zevely, F. M. Grant and J. C. Frazer are the incorporators.

The Feeding of Castings.

In the May number of THE FOUNDRY A. W. Pierson refers to some well known shops, who make it a practice never to feed their castings, but instead build up the pouring gate. This is merely a subterfuge and is to be compared with the method sometimes resorted to of turning the mold upside down as soon as the iron with which it is poured is reduced to a plastic condition. Both of these methods will answer in the case of a counter-balance, a dumb bell or on such castings where the outside appearance is the only thing which needs to be perfect. If such castings should be cut in two a cavity would undoubtedly be found at their center. I am aware that many large pieces are cast without being touched with a feeding rod, such as cylinders, which are cast on end. These castings may appear perfectly sound and answer the purpose but nevertheless there are hollow spots somewhere. An engine crank-disc or a flywheel, the rim of which sometimes travels at the rate of 80 feet per second, must be solid clear through, and feeding with a rod is the only treatment which will accomplish this.

Mr. Pierson also says that in his experience he has found soft iron to require the most feeding. I cannot agree with him in this as I have noticed several times lately whenever a change has been made in the mixture of iron that shrink holes would occasionally appear in the lugs and hinges of doors cast therefrom. Whenever this has occurred there would invariably come a kick from the chipping room to the effect that the castings were running harder, which in my opinion disproves Mr. Pierson's statement. Again, this writer holds that about four feeding heads on the rim of a 15-foot flywheel are sufficient to properly feed such a casting. Some years ago, while working for the Morgan Engineering Co., of Alliance, O., I frequently saw not less than nine feeding heads placed on the rim of a seven-foot flywheel, and will stake my reputation on the fact that a casting thus fed will never go to pieces unless the same is subjected to the casting breaker. Does it not sound reasonable that when a casting cools on the outside first, as it invariably does, that if the heart or center of same can be reached by several feeding rods and hot iron applied thereto that such a casting will be much more solid than one not so fed? It seems to me as if the more feeding rods there are employed the more perfect will the casting be.

An Answer to Mr. Ramp.

It is interesting indeed to note the comments in your November issue from the pen of Mr. P. R. Ramp, yet it may not be amiss to assure Mr. Ramp and other readers of your journal that the questions in the September issue of The Obermayer Bulletin of Foundry Information, under the head of "Pig Iron," were actually propounded to molders in foundries which the writer has visited, and the answers given as noted. This does not signify, however, that there are not lots of molders who might have answered the questions correctly.

It must be borne in mind that a molder does not have to be conversant with metals, coke or the charging of a cupola, in order to receive the standard of pay as a molder. Lots of them are not so fortunate as to be under the foremanship of such a man as Mr. Ramp, as illustrated by the following letter received from a molder:

"I have secured lots of information from your Bulletin about pig iron. I have tried to get our foreman to tell me about mixtures and the brands of iron we use, but he has always stood me off. I am in hopes of preparing myself for a foremanship, but I'll never do it with his help."

This should not disparage the foreman referred to; he doubtless has a great many things on his mind, and in all probability has not the time to discuss the various subjects along this line with his men.

I am inclined to differ with Mr. Ramp in his statement that "the list of questions and answers as have been published in this Bulletin under the head of pig iron would certainly be very discouraging, if not degrading, to the few molders who may not understand just what pig iron is." It strikes me that human nature is the same the world over. Just so soon as we find ourselves lacking knowledge of a subject we are interested in, our natural inclination is to master it.

The origin of my idea of writing on this subject in the way I have sprang from an article in the *Iron Age*, the writer of which stated: "The average man does not require or even desire to be better educated. He sells muscle and manual dexterity only, and does not need any theory or a knowledge of x plus y to obtain the highest wages in his craft." This may be, and doubtless is, true in many cases, but I maintain that if the information were to be had in a simplified form, it would be read and studied closely, with the result that the molder as well as the employer would reap a golden harvest from the knowledge.

While certain sections of the Bulletin have been freely commented upon, no reference has been made to our announcement (which in justice to us might have been done), in which we say: "The suggestion was made to the writer by one of his friends recently that we might antagonize some molders by producing the matter we have in mind—that no one cared to be reminded of his lack of knowledge of a subject he was daily coming in contact with. It is not our intention to belittle any man, especially he whom we wish as our friend, and we do not believe any molder would be so foolish as to believe we would do so.

"We assure you our intention is to aid, not to antagonize you. Take the subject of pig iron; every man knows in his mind what it is, but few, perhaps, could explain its chemical properties. In the broad sense of the word, this does not indicate ignorance."

Letters we have received from molders would indicate that they have received this matter in the spirit in which it was written, as is illustrated by the following letter from a West Virginia molder:

"Your Bulletin and your letter of the 24th rec'd. Allow me to express my thanks for your putting my name on your mailing list. There need be no fear of antagonizing the molder, for your first Bulletin has excited favorable comment. I work for the ——— Co. and am on the floor."

I am at a loss to understand whether Mr. Ramp, in his criticism of the Obermayer Bulletin, writes from the standpoint of a molder or a foundryman. If a molder, he should readily appreciate that a great many foundries, or rather manufacturing concerns with foundries in connection, do not appreciate the necessity of having proper tools in their foundry. This is often apparent to anyone selling foundry supplies who calls on the trade and comes in contact with a manager or purchasing agent who thinks that this or that article can be dispensed with. Has he not been in a foundry where perhaps half a dozen men were using the same pair of bellows, where riddles were few and far between and a good shovel at a premium? I have been in a number of shops where these and other conditions had to be contended with.

E. J. WOODISON.

The Melting Ratio.

Much has been said and written as to the amount of fuel necessary to melt a certain amount of iron, and many of the people who have gone into print with their ideas on this subject have on the face of things never stopped to verify their figures. Some time ago *The Engineer*, of London, England, published a series of articles dealing with the foundry industry of the United States, and particularly with the making of cast iron pipe in this country. In some of these articles cupola records from different foundries were added, the general average for regular daily work being about 10 pounds of iron melted by 1 pound of coke, including the bed, although one of the plants claimed a melting ratio of 12 to 1. An English contributor insisted that a melting ratio of 10 to 1 was very low, and intimated that with a patent cupola (which by the way happened to be his own invention) he could melt from 12 to 16 pounds of iron with 1 pound of coke in a heat of 80 to 100 tons. As is general in the case where a high melting ratio is claimed, no details were given as to the class of castings or conditions existing at any particular plant. The writer did not even state whether his figures included the amount of fuel used in the bed.

Taking up the question of melting iron and the amount of fuel necessary to accomplish this, Mr. E. E. Russell Tratman, of Chicago, says in the same journal that too many comparisons between American and English practice have been made on insufficient and unequal bases. No information is at hand which tends to show that English foundries melt iron with any less fuel than is done in this country. In some discussions as to the relative merits of different cupolas and the efficiency of different shops, it has been assumed that the melting ratio, or the amount of iron melted per pound of coke should be a basis for a comparison of results. The idea that a foundryman's ability should be judged by the amount of iron he can melt with a pound of coke is erroneous, for the reason that the amount of fuel consumed will depend upon the character of the castings produced. Then again, comparisons of this kind are weakened by a lack of uniformity in figuring the quantities involved; the variation in the quality of pig iron and coke, the size of the cupola, the amount of iron melted at one heat, etc., are also subjects which must be taken into consideration in this connection. For small light castings the metal must be very hot and fluid, and requires more coke in melting it than large rough castings which can be poured at a much lower temperature. While ratios of 12 to 1 and even higher have been claimed by American foundries, these usually represent special conditions and not regular daily practice. Two pipe foundries report melting records of 14 to 1 and 14.6 to 1, the latter shop turning out at this time a very heavy pipe, which did not require very hot iron. At the same time it is evident that melting at this high ratio is not considered satisfactory. It is generally recognized to be poor practice to cut down the amount of coke at the risk of losing castings through dead iron and cold shuts.

Mr. Tratman addressed a letter of inquiry to a number of American foundries, asking them for information as to the results they obtained in melting. Among those who replied were the following:

Dr. Richard Moldenke, secretary of the American Foundryman's Association, writes: 10 to 1 is an average of the best American cupola practice, and these figures only hold good where there is a heavy output, say 50 tons and over of uniform work. The jobbing foundry which can melt 8½ to 1 is doing well, and more often they will be found melting 8 to 1, or less. For small heats it is impossible to get over 1 to 6. In my own experience I have with an output of 15 tons obtained a melting ratio of 1 to 5.8, with 25 tons, 1 to 8.2, and with 54 tons 1 to 10.1. The class of castings was railroad work of uniform shape and weight, with some heavy work thrown in, the iron for all being melted in the same cupola. The best results I ever obtained were in melting white iron for heavy annealing pots, in which class of work coke can be saved, as the iron need not be very hot. In a heat of 65 tons I have obtained a melting ratio of 1 to 11.8. In taking off small heats in the cupola for malleable castings, it is seldom that one obtains a better ratio than 1 to 4.

W. J. Keep, superintendent of the Michigan Stove Works, Detroit, Mich., says that the amount of fuel required to melt iron depends on the class of castings the foundry produces. For very heavy castings it is possible to do better than 10 to 1, but for light machinery and hardware, 9 to 1 would be very good, and no one should complain if only 7 or 8 pounds of iron is melted with 1 pound of coke for this class of castings. It is admitted that we melt more economically in the United States than

do the foundries of England. Iron hot enough to pour a casting a quarter of an inch in thickness was never melted at a ratio of 16 to 1. So much depends upon the method of figuring, and whether all materials are actually weighed. Of course this should be done before any information of this kind is of any value whatever. The coke and iron recovered in the dump should not be weighed, but should be charged next day along with new material or else substracted from the day's iron and weighed the next day.

W. G. Scott, chief chemist of the J. I. Case Threshing Machine Co., Racine, Wis., whose investigations of foundry practice are well known to the readers of this journal, says that in the Case foundry (making argricultural machinery) the melting ratio will average about 1 to 8, although it varies from 1 to 6 and 1 to 9, the latter figure being seldom attained. Much depends upon the size of the cupola and surrounding conditions. With a ratio of 1 to 6 one is sure to obtain a good hot iron, while with a ratio of 1 to 10 the chances are favorable to cold iron and trouble with cold shuts. Ordinarily 1 to 15 is impracticable, and when such cases are reported it is usually found upon investigation that the foundryman did not include the bed of coke in his figures, or else forgot to weigh his coke altogether. There is no econmy in spoiling 15 tons of high-priced iron for the sake of saving half a ton of cheap fuel.

At the General Electric Co.'s Foundry, Schenectady, N. Y., the average records obtained for a year show that a little over 9 pounds of iron have been melted with one pound of coke, which probably represents the best results obtained in large iron foundries. Records of individual heats show that 10 pounds of iron have been melted with 1 pound of coke at times, but this was done under the most favorable conditions.

The Westinghouse Machine Co. writes as follows: We buy our coke by the carload, and the weights given are all railroad weights. We are frequently compelled to pass railroad weights which are in excess of our own scale weights. During the year 1900 we purchased for our East Pittsburg foundry a total of 3,731,000 pounds of coke. A proportion of this, impossible to account for accurately, was used in our brass foundry for melting stock in crucibles; a certain amount was employed in the making of cores, and some of this fuel was also used in building open fires during the severe winter weather while our building operations were going on. If we dealt with the total coke purchased and the total iron melted, then we have a very low ratio, viz., about 5 pounds of iron per pound of coke. If, however, we depend upon the cupola man's detail reports of iron melted, and coke used, our average runs up somewhat higher, and the ratios, according to such reports, are nearly 6½ to 1. We believe that there is a great deal of fallacy about the high reports which are oftentimes seen in print. Our practice is probably as good as the average foundry in this respect, and we are disposed to think that where ratios ar high as 10 to 1 are reported that the party so reporting them is simply fooling himself. If he had the ways and means of comparing the total coke bought and paid for with his total iron melted he might discover a wide discrepancy. Our heats, as a rule, are comparatively short; we endeavor to melt as fast as we possibly can, in order to delay the time for our first pouring to as late in the afternoon as will enable us to finish up the day's work by our regular quiting time. As a consequence, our cupolas have to be charged on the first bed as usual, no matter how short the heat may be; and when we dump the cupola at the close of heat we have the constant waste which is incident to this end of the operation. If we were melting continuously, as some foundries do, or as the Bessemer steel works frequently do, we would reduce very greatly the average loss at both ends of the melting, and make a better showing. In addition to this our castings are largely of the critical sort, and we must have our metal good and hot. We make this explanation to in part justify a ratio of coke to iron which might seem to be woefully poor. We have good cupolas, of most modern construction, and we feel that they are operated to fairly good effect. We run five cupolas in our East Pittsburg foundry, although not always employing the total number, since our heats vary in size from day to day.

The Philadelphia Foundrymen's Association.

At the November meeting of the Philadelphia Foundrymen's Association the committee on nominations for officers for the ensuing year made its report, and the gentlemen named were unanimously elected. The new officers are as follows: President, Thomas Devlin, of Thos. Devlin & Co., Philadelphia; vice president, Jas. S. Stirling, of the Harlan & Hollingsworth plant of the United States Ship-

building Co., Wilmington, Del.; treasurer, Josiah Thompson, of J. Thompson & Co., Philadelphia; secretary, Howard Evans, of the J. W. Paxson Co., Philadelphia. Executive committee: D. G. Moore, of S. L. Moore & Sons Co., Elizabethport, N. J.; Thomas M. Eynon, of the Eynon-Evans Co., Philadelphia; E. E. Brown, of E. E. Brown & Co., Philadelphia; R. C. Oliphant, of the Trenton Malleable Iron Co., Trenton, N. J.; and Wm. Hanson, of the Pennsylvania Iron Works, Philadelphia.

Under the head of new business there was a discussion on "The Melting Ratio." The subject was opened by the reading of the following paper, prepared by Arch M. Loudon, of New York, on the subject of

Cupola Practice.

At the present time when so much is being said and written about foundry matters in general I believe a little more attention should be directed toward the practical features connected with cupola practice, as the majority of foundries are more or less dependent upon, what may be termed, uneducated cupola tenders to obtain success in this department. While it will prove of considerable benefit to know something about scientific methods of mixing iron there is much to be done around the cupola which does not come under the control of the chemist, but which none the less demands careful consideration.

It may be said that they who are entrusted with the job of preparing the cupola after each heat know very little of the why and wherefore of the work. I have often noticed the diameter of the lining immediately above the top of the tuyeres to be two or three inches larger than it is below the tuyeres, which has a tendency to cause the iron and melted slag to drip down into the tuyeres when they will eventually be choked up. Had the cupola tender been taught to bridge the top of the tuyeres and always kept them that way, the trouble mentioned could have been done away with entirely.

I have often seem men use picks or similar tools in chipping out cupolas with the result that they have forced away large portions of the lining. After this has taken place from day to day it may finally be found necessary to reline the cupola for a considerable distance which costs a good bit of money, when if the cupola man had been properly instructed the greater part of this expense could have been avoided.

I have found from practical experience that equal proportions of kaolin and molding sand, mixed with clay-wash, forms an excellent daubing material, and makes the chipping out of the cupola simple and safe, thereby insuring a longer life to the lining. After doing so, apply this material in the form of a thick paste all around from the bottom as far as one can reach above the melting zone. After putting up the bottom doors and securing them in position, take a mixture of old sand, as coarse as possible, and properly tempered to avoid steam and blisters, and ram this in to the thickness of about nine or ten inches, keeping it highest around the walls of the cupola, inclining slightly downward to the tapping hole, and wash over with coke facing or any cheap mineral mixed like black wash. In following the above method of making the sand bottom, runouts will be avoided.

Take a 1¼-inch pin to form the tapping hole, and ram up around this with kaolin only, keeping the pin on the same angle as the bed. Place some oily waste on the bottom, carefully insert the kindling so that none of the wood will destroy the bottom, and after this has been all put in, the point is reached where the fuel is added, and if so desired the chemist can take charge of what follows.

D. G. Moore, of S. L. Moore & Sons Co., said that the fuel ratio had interested them particularly some time ago and resulted in a careful 60-day test, in which iron and coke were weighed daily, no deductions being made for the scrap or coke remaining after the heat was run. The cupola used was of the Mackenzie type, 30x60 inches. The mixture was two-thirds pig iron and one-third scrap, the total heat 25 tons, and 72-hour foundry coke was used. The result obtained varied as to the temperature of the metal. With good hot iron for machinery castings, 9 to 1 was the average, in some cases 10 to 1 was obtained, and even 11 and 12 to 1. In the last, however, the iron was cold and figures therefore were of no value. At this foundry the best results were obtained at an average ratio of about 9 to 1. They prefer the practice of operating two smaller cupolas to one large one, running each hot right up to the end of the heat. In their heats of 25 tons they frequently take four grades of iron from the cupola—soft, hard, chilled and steel mixed—in which cases more fuel is required owing to the blank or parting charge of coke, and the ratio in each case becomes lower.

James S. Stirling stated that he considered a record of cupola operations a very important

thing and in the foundry, with which he is connected, everything entering the cupola is weighed, and it is their custom on account of the low tuyeres of their cupola to use steam boat coal for the bed, charging coke on the top of this. For the class of work this company turns out, it has been found that it is economy to melt the iron hot. During the past three or four years the average melting ratio has been about seven and one quarter to one, the heats averaging about ten tons each.

Thomas I. Rankin, of the Abram Cox Stove Co., stated that in their foundry, which is devoted almost exclusively to light work, many castings being only 1-10 or 1-12 inch in thickness, and measuring up to 38 inches square, it is absolutely necessary to have a very hot iron, a fact which is scarcely appreciated by foundries turning out heavy castings. They melt from 6.8 to 7 pounds of iron with a pound of first class coke. Mr. Rankin said that there should be but very little trouble experienced in obtaining accurate weights if proper facilities are provided. At one of their plants they have the scale in the yard and the charging barrows have the tare plainly marked on the sides. As they are run onto the scale a little manipulation of the scale beams gives the weight almost instantly.

W. H. Ridgway, of the C. Ridgway & Sons Co, told of the system followed in their foundry in measuring the amount of fuel necessary for their cupola. Instead of using scales they have an unwritten law that the man on the cupola platform shall use so many shovels full of coke for the bed and so many for the different charges of coke which follow. The speaker said that this has worked well in practice and that results have been very accurate. At one time they thought they were melting at the ratio of 10 to 1, but since the fuel problem began to disturb the foundries they have said very little about the amount of coke consumed in melting, as they are compelled to use anything which in any way resembles coke, and is thought capable of melting iron. Mr. Ridgway thought that the kind of fuel foundries were using at this time was of rather inferior quality.

Pittsburg Foundrymen's Association.

The foundryman has experienced considerable difficulty during the last twelve months to obtain a satisfactory supply of coke, in quality as well as quantity. At its November meeting the Pittsburg Foundrymens' Association took up the subject of "Coke," to which Mr. N. P. Hyndman, of the Washington Coal & Coke Co., contributed the following:

I doubt if there is any other commodity used in foundry practice that is, just at this time, giving you more concern. The centralization of the iron and steel interests has brought about a consolidation of coke interests, the result of which is that the large producers of iron and steel are the owners of their own coke works. This ownership is the manipulation of years, the buying up of coking plants and undeveloped land, until now we find the great Steel Corporation so much in possession, and their requirements of coke so large, that they have announced to the general foundry trade, through their coke department, the necessity of withdrawing their present production of foundry coke after this year. This is the reason, I say, that the matter of coke supply is no doubt causing some of you much anxiety. You perhaps have had a regular source of supply for years, of a quality that suited your work, and you must now look elsewhere and enter the experimental period again. The development of coke production has been so extensive in the last five years that I do not think you need fear any trouble in securing the quantity you want. In fact, there are now about 3000 ovens under construction, or contemplated, in this State, and most of these in the Pittsburg and Connellsville regions.

The coke subject has been a very interesting one from the date of its introduction in the manufacture of iron, especially since it has to a very large extent displaced anthracite coal and charcoal in the smelting of ores, and much may be said of its past history. I propose, however, to confine this paper more particularly to the period most interesting to our local trade conditions in the coke business from a salesman's standpoint.

About the year 1885 our esteemed fellow citizen, Mr. Frick, the largest producer of Connellsville coke, commenced to buy out his competitors, and continued doing so until he had secured a large part of the developed properties and coking coal land in the region. The result of his action is the extensive coke supply of the United States Steel Corporation today. Within the last five years a large addition has been made to the number of coke works in Fayette and Westmoreland counties, Pa., by large consumers and new investors. These developments are principally in the "Klondike" or Lower Connellsville District. Some of them have become the property of

the United States Steel Corporation, while a number of other plants there are operated by individuals. Increased developments have also been made in the Greensburg and Latrobe districts.

Quality is the most interesting part of the subject to you, no doubt. Previous to ten years ago the consumers demanded coke made in the Connellsville region between Mount Pleasant and Uniontown, as they considered that the heart of the region, and thought only there could coke of satisfactory structure, hardness and chemical analysis be found. They insisted sulphur should be 0.75 per cent, or not to exceed 0.85 per cent. Even in that section of the coke region the producer tried to impress you with the fact that the deeper the coal the better the coke. This may be true, but it did not prevent the drift mine producer from selling his coke at all times and in the same markets.

The development of coking coal lands adjoining the field above described was afterward commenced, and coke from the north end of the Connellsville region, and the Greensburg field, was accepted with favor. The quality of coal seemed to be satisfactory for coking except that the sulphur in some of it was higher than the trade would accept. This, however, was corrected by the coal washing process. The lower end of the Connellsville field, south of Uniontown, produced a coke that was said to be wanting in strength, but this impression is not held today.

The next field to come into prominence was the Masontown field in Fayette County, now called the "Klondike" or Lower Connellsville. Previous to five years ago no effort had been made by the farmers to sell these lands, but about that time some Pittsburg capitalists, anticipating an increased demand for coke, invested largely in this field, and it is today a beehive of activity in coke production. Two trunk line railroads enter the field with additional railroad facilities to be added. This coke is being shipped all over the country and used for all purposes. The quality is good. The same condition exists there as in all other coke territory—viz., that you may find some coal with sulphur a little higher than desired. This, however, if continuous, may be corrected with a washer. No washers, however, are in use there now.

I want to speak of the quality of coke in general. The demands on the shippers for sulphur of 0.75 to 0.85 per cent has not been continued during the last few years. We find the foundry consumers are as willing to accept coke with 1 per cent sulphur as they were to accept 0.75 per cent. Whether the former demand was based on prejudice, or whether you have introduced such methods in your foundry practice as will enable you to use higher sulphur I do not know. The foundry coke shipper and his customer sometimes get into a controversey about quality of coke judging from its appearance, and the objectionable feature may be nothing more than black tops. I have been asked to go miles to see such coke, with the expectation on the part of the buyer that I will acknowledge it inferior, and almost pay him to keep it. The fact is the coke was hard, thoroughly burned, and in every way first class. The discoloration is the result of overheating of the oven, which melts the coal too suddenly, forming a crust over the top, which prevents the gases from escaping. These decompose and leave a deposit of lamp black in the cells of the forming coke. The result is "black tops." We also have in the manufacture of coke "black butts," which we acknowledge are objectionable, owing to the fact that the coke is not thoroughly burned, therefore soft. This coke is found at the base of the oven, due principally to insufficient heat in that part of same, and this may be caused by dampness in the earth on which the oven is built, or from exposure of the empty oven before charging.

It is surprising how large a number of people interested in the consumption of coke, living remote from the coking coal fields, are ignorant of its mode of manufacture. You have had this subject presented to you very intelligently through the writings of your esteemed [illegible] ate, Thos. D. West, and through the coke expert, John Fulton. I assume, however, that a concise explanation of the process in this paper would not be amiss.

The style of oven principally used in this country is the beehive type. The by-product type is being introduced, but the preference in America to date seems to be for beehive ovens. These remarks, therefore, refer only to the latter. They are built in solid rows of any number consistent with the character of the surface of the ground. They may be "bank ovens" (single row built against a hill) or block ovens (double row on open ground). The coal is carried to them in "larries" holding enough coal to charge the oven, and running on a track built on top of the row of ovens. The coal is charged from the larry into the ovens through a hole in the top. The

process of applying the heat is where we find many people mystified, or laboring under a wrong impression. When the oven is new the heat is applied by burning wood until the bricks get thoroughly hot. The oven is then charged with coal, which ignites. The burning is from the top of the oven to the base. When the coke is ready to draw the door in front of the oven is opened and the cooling process started. This is done by quenching with water through a hose pipe, manipulated by the drawer. When cool enough to handle the drawer pulls the coke out on the yard with a large iron fork, finishing the quenching outside, as too much water permitted in the oven would tend to reduce the heat. As soon as possible after the oven is emptied it is recharged from the larry with the same quantity of coal as before, and the burning process commences instantly from the heat of the oven. This continues during the entire period the oven is in operation.

Coke is burned 48 and 72 hours, 48 hours because a certain quantity of coal will burn in a certain sized oven that length of time with best results to produce the highest quality of coke for blast furnace use. The 72-hour coke, being burned longer, is harder, and consequently of better quality, and is specially adapted to foundry practice.

The abnormal trade conditions existing today between the coke seller and buyer, as to price, are causing much anxiety as to the future. Those of you who have contracts and are being regularly supplied probably do not realize the condition I refer to. Owing to the anthracite strike, and the inability of the railroads to move the coke promptly, a great scarcity has existed throughout the country, with the result that prices ranging from $8 to $14 per ton at ovens have been freely paid for foundry coke for spot shipment, in quantities ranging from 1 to 100 cars. Never in the history of this country has such a state of affairs existed before. Normal conditions would now soon apply if the railroads could promptly move the coke produced. I predict that with better railroad facilities, together with the increased production of coke, the consumer can expect prices that will more nearly conform to the prices of iron.

Mr. C. A. Stroh, of the American Locomotive Co., voiced his opinion as follows:

During these brisk times it is next to impossible to secure really first class 72-hour coke, yet the coke manufacturers insist that the product has remained in the ovens for the stipulated period, that it is the best grade obtainable and that the highest price should be paid for the same. The foundryman is confronted with an unusually high percentage of bad castings, and while not doubting the truth of the coke agents' statement, cannot help but believe that the coke he has been using is largely the cause of the big percentage of bad castings he is turning out. The coke agent usually claims that other conditions in the foundry are at fault, and it is always a wise policy to investigate conditions to ascertain whether the proper percentage of coke has been used and whether the blast is in proportion to the amount of coke used. If you are not using your blast and coke in the proper proportions you cannot possibly obtain the proper results. If the blast is too great in proportion to the amount of coke used, oxidization will result and will cause the iron to be too hard, while on the other hand if too much coke is used in proportion to the blast carbonic oxide is formed, causing blow holes, the cause of which we are so often asked to explain by the machinist.

Very few foundry foremen keep track of the coke that comes into the foundry from time to time and even the cupola tender often fails to report bad coke until he is nearly choked to death by the sulphur fumes while charging and tapping. Some time ago I had some difficulty with coke. The coke shipped was dirty and weak, showing deep dark ends or niggerheads and having flat pieces of slate running through it as large as a quarter of a dollar. Of course the coke agent insisted that it was 72-hour Connellsville coke, despite the fact that the sulphur fumes resulted in the cupola tender laying off on account of illness. Good coke is clean, bright and strong, and is high in fixed carbon and low in ash.

Mr. S. D. Sleeth, superintedent of the Westinghouse Air Brake Co.'s foundry spoke briefly of his experiences with cokes high in sulphur, and said that they had produced soft castings successfully with coke running as high as 1.65 and 1.71 in sulphur, despite the fact that most foundrymen insist on holding their sulphur down to .65 and .75. He said that his success with this high sulphur coke no doubt was due to the large amount of limestone used in the flux, which took up the greater portion of the objectionable sulphur. He further cited an experience with light coke which is out of the ordinary. It ran as high as 88 in fixed carbon, 10 and 11 in ash and about .85 in sulphur, and did not require as much coke in weight, the bulk being the same, to produce a

given amount of castings as the heavier coke. Analyses of coke taken from the bottom, center and top of the ovens, showed very little difference, although it is the general impression among the trade that coke taken from the center is much more desirable than coke taken either from the top or bottom.

The question of 72-hour coke was discussed at length. Mr. Howard Hooker, of Rogers, Brown & Co., stated that it is an absolute necessity, owing to labor conditions, for the coke manufacturers to produce this kind of coke over Sunday, and it was suggested that possibly this was considered the best coke on account of the conscientious scruples of the coke workers in refusing to draw the ovens on Sunday, which is the case in the Connellsville region.

None of the foundrymen present were absolutely certain that they could recognize 72-hour coke, although insisting on its delivery for their foundry use. G. P. Maury, of the Metallurgical Laboratory, stated that he attempted to obtain a sample of 72-hour coke for the purpose of making an analysis of the same, but found it almost impossible to secure it for the reason that none of the foundrymen in Pittsburg were certain that they had any on hand. Most of the foundrymen present stated that they had had great difficulty in getting prompt deliveries of coke, and were very well contented to take either 48-hour or 72-hour coke, if they could get it. It also developed that a number of foundrymen were paying very large prices for coke, in spite of the fact that they had contracts at comparatively low figures.

One of the foundrymen said that a large stove foundry in Detroit is using by-product coke to good advantage, despite its dark appearance and structure. Some of the foundrymen stated that they had attempted to use this coke, but were not successful and had never repeated the experiment. It was the opinion of those present, however, that there was a possibility that this kind of coke will be used more extensively for foundry work in the future, prejudice now militating against it.

Conference Between the National Founders' Association and the Iron Molders' Union.

During the first part of October a National conference was held at Detroit, Mich., between representatives of the National Founders' Association and the Iron Molders' Union. Several questions of general interest to the jobbing and machinery foundries were taken up, though it will be noted from the following account of the proceedings, for which we are indebted to the *Iron Molders' Journal* that but little actual progress was made towards a settlement of the differences existing between the two bodies. The association was represented by W. D. Sargent, president; A. C. Pessano, I. W. Frank, W. H. Pfahler and Commissioner John A. Penton. The union representatives were Joseph F. Valentine, president; M. P. Murphy, chairman, and by John Bradley, J. H. O'Neil, John Loder, W. A. Perrine and David Black, of the executive board. In addition there were present Trustees Lawrence O'Keefe, Alex. R. Mitchell and George M. Digel, of the Iron Molders' Union. Joseph F. Valentine was made chairman of the conference.

On behalf of the N. F. A., Mr. Pessano outlined what, in the opinion of his associates, were bars to the harmonious progress of the two bodies. He urged that there were not enough skilled mechanics to supply the present demands of the foundries, and that therefore the union's restrictions as to the employment of apprentices were ill-advised and should be removed. He argued that if there were no restrictions whatsoever, the molders' position would in no wise be threatened, and that in the jobbing and machinery foundries, to which his entire argument was to be construed as applying, the fear of the employment of an excessive number of boys was groundless.

Mr. Pessano severely condemned those who sought to limit output, and cited instances of recent occurrence wherein men were said to have been fined and expelled by local unions of the I. M. U. for making jobs in less time than had previously been done. This, he contended, was wrong in principle, and could not be successfully defended or upheld by the union's representatives. He also held that opposition to the introduction of the piece price or premium systems was a wrong policy, and that the system under which work should be made should be determined by the employer, who was responsible for the conduct and success of the business.

Continuing, Mr. Pessano dwelt exhaustively upon the subject of differentials in wage rates. There was a decided difference, in his opinion, between the skill of the bench molder and the floor molder, and that disparity should legitimately and equitably be reflected in their wage rates. For economic reasons, needless to out-

line, the wage rate of a large city should in all fairness be greater than that which prevails in a small town. And finally the specializing process had made it possible for the foundryman to employ to advantage men of less skill than the average on low grade work. This fact should be recognized by the Iron Molders' Union and provision made whereby these men could be employed at a rate less than the standard rate.

Mr. Pessano referred briefly to the question of the operation of the molding machine, and gave it as his opinion that the chief objection of the foundrymen to the employment of molders as operators was based upon the fear that they would restrict the output of the machine and thus increase the cost of the product. He concluded his argument by making a strong plea for agreement upon the several points he had touched upon, and the formulation of a national wage agreement which would be of general application, and which would enable the two associations to avoid the difficulties and the friction resulting from the negotiation of local agreements, many of which embodied essentially different propositions.

A general discussion followed this statement, the union's representatives taking strongly opposing ground upon several of the propositions. They expressed pleasure that the representatives of the N. F. A. had determined to classify its membership, and that for the first time it was possible to deal specifically with the jobbing and machinery foundries included in the membership of the N. F. A. It was urged that the removal of all restrictions upon the employment of boys in the jobbing and machinery foundries would pave the way for the gravest abuses and would accentuate the present scarcity of mechanics of the highest skill. This scarcity was in a large measure due to the policy of many foundrymen in employing boys for the profit that was in their work, and not to perfect them in the trade of their choice. It was held that instead of seeking the removal of all restrictions, the best interests of the foundry industry would be conserved by agreeing upon an equitable ratio of apprentices.

The union's representatives agreed that the arbitrary limitation of output was wrong in principle and contrary to the best thought in progressive and enlightened trade-unionism, but held firmly to their contention that arbitrary exactions on the part of the employer or his foreman were equally worthy of condemnation. The Iron Molders' Union would not defend those who would not give a fair return for the wages paid them and who sought to prescribe arbitrary limitations for themselves or others, but reserved the right to protect the health and comfort of its members against those who sought to exact a day's work which was unduly large. The difficulties in the way of determining where arbitrary limitations ceased and arbitrary exaction began were acknowledged, but assurances were given that the union's representatives would at all times co-operate in arriving at a just decision when a specific case was brought to their attention.

It was further contended that to the employer alone the sole right should not be given to determine the system under which work should be made, and attention was called to the fact that the piece price and premium systems, by appealing to the cupidity of the individual, had, in the past, resulted in a very material increase in the burden of the molder without commensurate advantage.

Differentials as between bench and floor molders in jobbing or machinery shops and the proposition that discrimination be made in favor of the smaller communities were declared by the union's representatives to be inequitable, especially the latter proposition, which was not in harmony with the best conceptions of present day competition. The proposition to give countenance to the employment of men upon low grade work in jobbing and machinery foundries was not viewed with favor, as a general proposition, by the conferees of the I. M. U., who felt that each case should be decided upon its own merits.

Briefly and in a general way this indicates the attitude of the two parties upon the several subjects figuring in the discussion. Each side apparently concurred in the thought that a general form of agreement adaptable as a ground work for all agreements ratified by members of the N. F. A and I. M. U. would be most advantageous and facilitate the adjustment of all differences upon wage rates or conditions. The experiences of former conferences demonstrate very clearly that no form of agreement could be devised whose terms could be made to cover the general foundry industry as it was represented in the membership of the N. F. A., and by mutual consent of the parties to the Detroit conference, it was determined to confine these first efforts to the machinery and jobbing

foundries only, leaving it to the future to formulate similar agreements for the other classes of foundries.

In order to place these thoughts upon record, a resolution was introduced by the representatives of the N. F. A., which, after being amended by the union's representatives, was adopted in the following form:

WHEREAS, It is the conviction of those who have given the subject of the relations of the employer and employe the greatest amount of study, that the most equitable way to adjust such questions as may arise to disturb said relations, is by the joint discussion of the issues involved by those directly interested or their representatives; and,

WHEREAS, It would further appear that when decisions have been arrived at that the interests of all parties are more effectually conserved by recording such adjustments in the form of agreements that define as far as may be possible the positions of all the interested parties; and,

WHEREAS, In the course of their relations the Iron Molders' Union and the National Founders' Association have entered into a number of said agreements, some of which are not similar in all of their terms; and,

WHEREAS, Said variattions have not been productive of the best results, but have on the contrary promoted a feeling of uncertainty; and,

WHEREAS, There are a number of localities and many members of both organizations not at this time affected by any agreement whatever; therefore be it;

Resolved, That it is the opinion of this joint conference representing the Iron Molders' Union of North America and the National Founders' Association, that the time has arrived when in its judgment the purposes of the two bodies will be best promoted by the formulation of a general form of agreement, national in its character, for each class of foundries, and that as far as possible it should cover all the points arising in foundries of the class covered by said agreement, and be subject to such modification in detail as may be necessary to meet the needs and conditions prevailing in the districts into which the membership of the Iron Molders' Union and the National Founders' Association may properly be divided, all such modifications to be of general application in the district for which they have been formulated.

It was generally agreed that it would be inadvisable and perhaps impractical to attempt to designate a definite sum as the basic or standard wage rate for the entire country, the thought being that the territory covered might be subdivided into districts which could equitably be placed upon a common wage basis. The representatives of the N. F. A. argued that in order to carry out the general idea suggested in the resolution adopted, it would be necessary to come to an understanding as to the differentials which would be mutually recognized. They proposed that there be a differential between bench and floor molders in jobbing and machinery shops, and one between large cities and other points in the same district. They also contended that cognizance should be taken of the low grade work which was found in every foundry and provision made whereby it could be made by a cheaper grade of labor.

A very lengthy discussion took place upon the subject of differentials, the union's representatives, as has been said, taking strongly opposing grounds to their recognition in the class of foundries under immediate discussion. It became manifest that there was a lack of necessary data to enable the conferees to determine definitely how a proposition such as that presented by the association's representatives would work out, and as there was little immediate prospect of harmonizing the conflicting views as expressed, the effort had to be temporarily abandoned.

Following the program outlined in their opening remarks, the representatives of the N. F. A. presented these two resolutions:

WHEREAS, We recognize that any attempt to restrict the product of a foundry, or the earning capacity of a molder, by placing a limit upon either, is unfair both to the employer and employe, and should be discouraged and prevented; and,

WHEREAS, The principle and laws of the Iron Molders' Union are opposed to any such restriction except in cases where they believe the molder is imposed upon;

Therefore, In order that their principle may be fairly understood by members of the union, the Executive Officers agree to promulgate such orders as will require that no local union can pass resolutions which shall directly or indirectly restrict the output in the foundry of a member of the N. F. A. unless such resolution shall have first been presented to and receive the approval of the Executive Board or officers of the Iron Molders' Union.

And:

WHEREAS, The rules of the Iron Molders' Union restricting the number of apprentices do not appear to be in harmony with the present conditions of business, and the establishment of a fixed ratio of apprentices to be employed (if such ratio should appear to be of mutual benefit to employer and employe alike), is impossible at this time because of the economic conditions involved; therefore be it,

Resolved, That in event of disputes arising upon this question between a member of the National Founders' Association and the Iron Molders' Union, it shall be the duty of the officers of the several associations to adjust such dispute in an equitable manner, based upon the conditions prevailing at the time in the locality in which the dispute occurs.

In discussing the first of these resolutions the union's representatives again expressed themselves as being opposed to all attempts at unfair or arbitrary limitation of output on the part of their local unions or members,

their attitude upon that point being fairly well expressed in the preambles of the resolution presented. They expressed pleasure that the association's representatives had acknowledged in their resolution the right of the Iron Molders' Union to protect its members against imposition on the part of the employer. It was stated that neither the laws of the Iron Molders' Union nor of any local thereof contained provisions relating directly or indirectly to a limitation of output, and furthermore the officers of the Iron Molders' Union had by precept and decision discouraged any attempt in that direction and would continue to do so, and would expect the officers of the N. F. A. to use their influence to discourage their members from making unjust demands upon the molders. While agreeing with the spirit of the resolution, the promulgation of orders as suggested in the resolution, would clearly be of little substantial good and of doubtful practicability. No action was taken on the resolution.

Reverting to the discussion of the resolution bearing upon the ratio of apprentices, the representatives of the union took the ground that the best interests of both parties would be conserved by mutual recognition of an equitable ratio of apprentices, and argued that that ratio should not be based upon the conditions now prevailing in the foundry industry, but upon a normal condition of trade. As a result of the decision of the Toronto convention, the union's representatives were not empowered to negotiate an agreement upon a ratio of apprentices other than one to every eight journeymen employed; but nevertheless they would be glad to receive from the representatives of the association any suggestion relative to the establishment of a ratio of apprentices that will be satisfactory to their members. But without the recognition of a satisfactory apprentice ratio they felt they could not agree to the subject matter of the resolution itself.

The representatives of the union asked the attention of the conference to the subject of the nine-hour workday in the following resolution:

WHEREAS, It is conceded to be the purpose of the National Founders' Association and the Iron Molders' Union of North America to promote the interests and welfare of those identified with the foundry industry, and to co-operate not only in harmonizing their views upon subjects affecting wages and shop practices, but in assisting each other to advance along the lines of economic progress; and,

WHEREAS, It is generally accepted as a truth that the developments which take place in an industry should not only contribute to a reduction in the cost of the product, but also to an improvement in the condition of the worker and a lightening of his burden; and,

WHEREAS, We believe the general trend points to a reduction in the hours of labor as being one of the most desirable means by which this purpose can be attained; therefore be it

Resolved, That on and after Jan. 1, 1903, the members of the National Founders' Association will recognize nine hours of labor as constituting a day's work for their molders; and that in these localities where ten hours of labor is recognized as a day's work the reduction of one hour shall be accomplished without reduction in pay, that is to say that the molders will receive for nine hours' labor the same wage as they formerly received for ten hours; and further

Resolved, That out of consideration for this concession upon the part of the members of the National Founders' Association, the members of the Iron Molders' Union will co-operate with their employers in using all improved facilities or methods introduced with a view to reducing the labor cost, to the best advantage.

The association's representatives took the ground that until we could come to an understanding upon the terms of a general form of agreement covering the question of differentials and other essential points, it would be futile to discuss the nine-hour proposition. They intimated that they had a proposition to offer, affecting the hours of labor, but it was contingent upon agreement upon the points already discussed, and until such agreement was reached they must decline to consider the subject.

The representatives of the union strongly objected to the nine-hour day being made the subject of barter. It should be discussed upon its merits alone and had no relation whatever to differentials in wage rates or apprentice ratios. A reduction in the hours of labor was a logical result of the developments in the industries, and foundry workers, than whom there was none that worked harder, were justified in demanding a shorter work day. Further than to agree that any local demand for a nine-hour day would be given unprejudiced consideration, the representatives of the N. F. A. would go no further in the discussion of the shorter workday as a national issue.

The union's representatives then introduced the resolution affecting the New York Agreement, which had been presented at the New York conference last April, and upon which it was now expected the representatives of the association would be prepared to render a decision. It read as follows:

Inasmuch as there has been some misunderstanding on the part of the members of the National Found-

ers' Association and the Iron Molders' Union of North America, affecting both the obligations assumed by each party under the terms of the New York agreement, and the status which shall be maintained, pending the application of the policy therein outlined, the following explanatory clauses shall be considered hereafter as part of said agreement, to govern the actions of the members of the parties thereto in their future relations:

(1) The New York Agreement provides as follows: "That in the event of a dispute arising between members of the respective organizations a reasonable effort shall be made by the parties directly at interest to effect a satisfactory adjustment of the difficulty." The words, "reasonable effort," herein appearing, contemplate negotiation upon the subject in dispute between the employer directly interested and the molders in his employ, or their representative or representatives, who shall make a serious effort to effect an adjustment. That, failing, however, the member of the National Founders' Association involved in the dispute should properly receive and treat with the president of the Iron Molders' Union of North America or his duly authorized representative with a view to making a further effort at adjustment before reference under the New York Agreement.

(2) When any change, whether of wage rate, shop practice or conditions, or any other change affecting the relations or the interests of the members of the parties to the New York Agreement is proposed by one of the parties thereto, to which objection or protest is raised by the other party, it is understood and agreed that the status originally existing, that is the status precedent to the proposed change, shall not be disturbed by either party pending reference and decision as provided in the New York Agreement.

To the great disappointment of the union's representatives the foundrymen declined to give an expression upon this resolution on the ground that the future relationship of the two associations was so intimately related to the formulation of a general agreement that no good results could be expected from discussions of such matters as those embodied in the resolutions presented until an understanding had been reached.

As the representatives of the union could not agree to the propositions of the other side affecting differentiations of wage rates and were not disposed at this time to submit a counter proposition along similar lines, it was apparent that no further progress could be made by the conference; but as there was evidently a disposition to get together upon the subject of a uniform agreement, a motion finally prevailed to adjourn the conference to such date, early in January, 1903, as might be agreed upon by the presidents of the two associations.

Harry J. Frank has sold his foundry at Davenport, Iowa, to the Red Jacket Mfg. Co., of that city, who will remodel the plant and install new equipment.

Among the Foundries.

The Blakeslee Foundry Co., recently organied at Brooklyn, N. Y., by Messrs. Taft and Read, has taken over the Columbia foundry and will manufacture a full line of plumbers' supplies.

The Star Iron Works, of Cincinnati, are reported as intending to erect a large iron foundry in the near future. A site has been obtained under a long term lease in the suburb of St. Bernard.

The Thos. D. West Foundry Co., of Sharpsville, Pa., is building large extensions to its ingot mold foundry. The steam power plant will be taken out and replaced by gas engines. Among other equipment four electric traveling cranes will be installed in place of the steam jib cranes which were formerly in use. Improvements are being made with a view of increasing the capacity of the plant to 400 tons per day.

The Toledo Castings Co., of Toledo, O., has been incorporated with $50,000 capital for the purpose of operating an iron foundry. W. C. Wright, W. R. Sinclair, L. W. Storey, M. S. Dodd and C. A. Schmettau are the incorporators.

The Fountain City Drill Co., La Crosse, Wis., is extending its foundry.

The C. A. Treat Mfg. Co., Hannibal, Mo., will build an addition 90x100 feet to its car wheel foundry.

Isaac A. Sheppard & Co. will add to their Philadelphia foundry a building 61x85 feet.

The Syracuse Foundry Co., of Syracuse, N. Y., has been incorporated with $10,000 capital for the purpose of operating an iron foundry. Robert Love, L. H. Kruger and G. J. Hessler are the incorporators.

The Raleigh Iron Works Co., Raleigh, N. C., recently incorporated with a capital stock of $50,000, for the manufacture of engines, boilers and general machinery, have purchased the works formerly occupied by the Allan & Cram Machine Co. T. L. Eberhardt is president and William T. Harding secretary.

G. A. Bullard, manufacturer of furnaces, Marshall, Mich., is adding a foundry to his plant.

The Ballard Iron Works have been incorporated at Ballard, Wash. A foundry and machine shop will be erected to be run in connection with the Hopkins Boiler Works, the owners of which are heavily interested in the new enterprise.

The National Steam Pump Co., having

removed from Marion, Ind., to Upper Sandusky, O., is completing its new factory, which includes a machine shop, 80x160 feet, and a foundry, 60x120 feet. The manufacture of steam pumps will be made a specialty. Officers are L. C. Call, president; R. J. Main, secretary, and J. M. Main, treasurer.

The building of the new plant of the Battle Creek Iron Works Co., Battle Creek, Mich., is progressing rapidly and the machinery is being placed. John J. Lumm, who for many years has been purchasing agent of the Advance Thresher Co., has resigned that position to accept the management of the new concern.

The Atlantic Iron Works, Norfolk, Va., formerly operated by W. A. Anderson, has passed to the control of Marwitz, Sterling & Co.

Sayre Bros. are operating one of the foundries formerly used by the Peninsula Foundry Co., at Newport News, Va.

The Martin-Anderson Co., of Omaha, Nebr., is putting up a foundry 40x60 feet.

The Berlin Machine Works, Beloit, Wis., have purchased additional ground to provide for the extension of their foundry.

The Meadville Malleable Iron Co., Meadville, Pa., has increased its capital stock to $50,000 and will build additions calculated to double its capacity.

The Seaboard Steel Casting Co., of Chester, Pa., has decided to make enlargements and improvements to its foundry plant. The proposed changes will include the erection of a steel building, connected with the main foundry, for the purpose of storing flasks. This building will be equipped with a traveling crane. A large new drying oven will also be constructed, and an additional furnace put in, making three of the latter, each of 25 tons melting capacity, which will enable the running of two furnaces at all times, with one in reserve for repairs.

The Vincent Valve Co., of Sandusky, O., has completed plans for a new brass foundry to be 42x100 feet.

The Manufacturers' Foundry Co., Waterbury, Conn., has prepared plans for the erection of a foundry and machine shop which will be 400 feet long and 80 feet wide.

The work of rebuilding that portion of the plant of the Lorain Foundry Co., Lorain, O., which was destroyed by fire some time ago, is progressing favorably. An addition, 96x150 feet, is also being made. This will be completed about the first of the year and will greatly increase the capacity.

The Hockensmith Wheel & Mine Car Co., of Irwin, Pa., has purchased a site near Penn Station, upon which its new works will be erected.

The Hub Foundry & Plating Co., of Ossining, N. Y., has been incorporated with $7,500 capital by William Haddow, T. R. Raymond and G. I. Rice.

The International Steam Pump Co., owners of the Holly plant, Lockport, N. Y., have directed the closing of the large foundry at that point. The patterns will be removed to Buffalo. It is reported that other portions of this branch will also be shut down and that the works will virtually be closed.

The new foundry of the Filer & Stowell Co., of Milwaukee, Wis., which is now being constructed, is located a mile south of their old plant at the corner of Beecher and Ziemer streets. The new works will have excellent shipping facilities by way of exclusive spur tracks running from the Chicago, Milwaukee & St. Paul and Chicago & Northwestern railways. In addition it will be connected with the old plant by private railway track. Two lines of electric cars will afford easy access to the property. The main building, including ovens, will be 245x400 feet, or 220x400 feet without ovens. There will be two main spans of 85x400x36 feet to the crane hooks. The main spans will have three electric cranes with two 30-ton trolleys on each bridge. The wing will have three 15-ton cranes. The storage, coke and iron sheds will be elevated a foot above the charging floor, so that coke and iron can be tracked direct to the cupolas from the cars or from the sheds. At the cleaning end of the foundry a track will run across the shop so that castings can be loaded on cars from either one of the three spans. Many appliances that will contribute to convenience and facilitate work will be used. The estimated capacity of the foundry is 2,500 tons clean castings per month. The company own 50 acres where the foundry is located and other departments may be transferred to the new locality later on.

The Elkhart Frog & Crossing Works, which were recently incorporated at Elkhart, Ind., with a capital stock of $30,000, have organized by the election of J. W. Fieldhouse, president; E. Goldthwait, vice-president, and F. A. Reed, secretary and treasurer. The company have decided to erect a machine shop 50x128 feet, a foundry 50x60 feet, and an office building

20x30 feet. All buildings are to be of brick construction.

The Downingtown Mfg. Co., of East Downingtown, Pa., will soon start work on a new foundry. The building is to be one story of brick and iron, 100x120 feet, and will cost $30,000. New equipment will be installed.

The De Kosenko Mfg. Co., Philadelphia, will build a two-story addition to its foundry. The addition will be of brick and steel with fire proof floors.

The P. P. Emory Mfg. Co., Springfield, Mass., is building an addition to its foundry, which will increase the capacity of the plant about one-third.

Capitalists identified with the Standard Steel Car Co., of Pittsburg, who have just completed new works at Butler, Pa., for the manufacture of steel cars, have secured control of the Southern Car & Foundry Co., which operates a rolling mill, four complete car building works and one building, a car wheel works and a car axle works. The rolling mill is known as the Anniston Works and is located at Anniston, Ala. The product is iron and steel car axles and merchant bar iron, the annual capacity being 9,000 gross tons forged and 30,000 tons of rolled products. The plant is owned by the Illinois Car & Equipment Co., but has been operated under lease for some time by the Southern Car & Foundry Co. The four car works consist of the Anniston Works, at Anniston, Ala., with an annual capacity of 12,000 freight cars; the Gadsden Works, at Gadsden, Ala., with an annual capacity of 3,600 wooden freight cars; the Lenoir Works, at Lenoir, Tenn., with an annual capacity of 3,000 standard freight cars, and the Memphis Works, at Binghamton, a suburb of Memphis, Tenn., with an annual capacity of 4,500 cars. The new plant is the Birmingham Works, under construction at Ensley, Ala., which will have an annual capacity of 4,000 steel cars. The car wheel plant of the Southern Car & Foundry Co. is located at Memphis, Tenn., and has an annual capacity of 65,000 freight and passenger car wheels. The car axle works, at Anniston, Ala., have a daily capacity of 120 axles. It is the intention of the Standard Steel Car Co. to very materially enlarge the capacity of the different plants of the Southern Car & Foundry Co.

The Barry Mfg. Co., Muscatine, Ia., has let the contract for the erection of a new foundry, 40x80, stone and brick. All the castings used by the company will be made in this foundry.

The Belmont Iron Works, Philadelphia, will build an addition to their foundry. It will be of steel, one story, corrugated iron sides, 20x 79 feet, and will cost $20,000.

The Benedict & Burnham Mfg. Co., Waterbury, Conn., has plans prepared for the erection of a foundry which will be 100 feet long and 200 feet wide.

The Toronto Brass Mfg. Co., Toronto, Ont., will erect a five-story plant, whose dimensions will be 98x100 feet. The plant will contain a brass foundry as well as a large brass fitting and finishing department.

The Taylor-Forbes Co., Ltd., Guelph, Canada, is the successor of A. R. Woodyatt & Co., who had been carrying on the manufacture of hardware and lawn mowers for many years. Owing to the death of Mr. Woodyatt, it was necessary to reorganize. The officers of the Taylor-Forbes Co. are: President and general manager, Jno. N. Taylor; secretary and treasurer, Adam Taylor; vice-president, George D. Forbes; assistant secretary, Jos. A. Hewitt; general sales agent, Harry R. Moulden. The capital stock is $300,000.

The Michigan Steel Casting Co., Detroit, Mich., has filed articles of incorporation. The capital stock is $300,000, of which $30,000 is paid in. The stockholders are: Karl R. Davies, Fred J. McMurtrie, Maxton R. Davies.

Thomas R. Stoner, of Alexandria, Ind., has purchased an interest in the Fairmount Foundry & Machine Works, Fairmount, Ind., and the company will hereafter be known as the Fairmount Machine & Tool Works. The plant will immediately be equipped with machinery for the manufacture and repair of gas and oil well tools of all descriptions.

The Jacksonville Machine & Boiler Co., Jacksonville, Ill., are incorporated with a capital of $6,000 to engage in a general foundry business. Incorporators: E. J. Rawling, Amos W. Kellogg, and John F. Kellogg.

The Oklahoma Mfg. Co., Hobart, Okla., which was recently incorporated for the purpose of manufacturing farm and other machinery, expects to have the best equipped foundry and machine shop in the Territory. The erection of the new buildings will be commenced at once. The organizers are: J. W. Bartlett, G. W. Compton, J. K. Spears, E. C. Printz and A. W. Lumm.

The John Michaels' foundry at Reno, Nev., has been purchased by the Fulton Foundry at Virginia, Nev. It is intended to consolidate

the two foundries and to increase the capacity of the plant.

The Ground Hog Plow & Foundry Co., Clarksville, Tenn., have completed their organization by electing the following officers and directors: J. M. Macrae, president; J. R. Rossetter, vice-president; W. M. Drane, Jr., secretary and treasurer; C. H. Drane, general manager; H. C. Merritt, B. W. Macrae and Matt Gracey. The company have bought the business of Drane & Co. and will enlarge the plant for the manufacture of the Ground Hog chilled plow, patented by Mr. Rossetter.

The Monongahela Foundry & Forge Co., Monongahela City, Pa., manufacturers of machine molded castings, will install an electric light plant and heating and ventilating system in their works. The company has completed improvements to its general foundry and is prepared to make gray iron castings of all descriptions. It has a capacity of 30 tons daily, 18 tons in the machine molded casting department, and 12 tons in the general foundry. In the machine molding department specially designed machines are used, covered by patents of the company, which will accurately mold pieces from 8 ounces to 150 pounds.

The Bucyrus Co. of South Milwaukee, Wis., are preparing to increase their foundry output. The company have let the contract for a steel and brick addition of 30x80 feet, and when completed this will give much-needed foundry space. Early next spring the company will widen the entire molding room 40 feet. The addition now going up will cost $30,000.

The Royal Stove & Range Co., Greenville, O., has been organized by John H. Martin, George W. Mannix, Jr., and J. R. Martin, of Greenville, and J. Walter Baker and George Jones, of Kokomo, Ind. The capital stock of the company is placed at $50,000. A foundry 76x121 feet is now being built.

The Perry-Hill-Mahan Foundry & Machine Co. has been organized at Anderson, Ind., with $9,000 capital. The members are M. C. Perry and Harry Mahan, who have been connected with the Woolley Foundry & Machine Works for several years, and Hugh Hill, of the Hill Machine Co. They have been figuring on organizing for some time and have purchased the equipment of the foundry formerly operated in connection with the Star Mfg. Co. at Pendleton, Ind. It is the intention to move this to Anderson. The company is now trying to lease a plant and if it fails buildings will be erected.

The Shirley Radiator & Foundry Co., Shirley, Ind., is completing its new plant. The main building is 75x250 feet and the warehouse 60x150 feet. The company will manufacture hot water and steam radiators and will also turn out light and heavy gray iron castings for the general trade.

The W. J. Scully Ventilator Co., of Detroit, Mich., will erect a foundry 40x80 feet.

The Niles-Bement-Pond Co. will build a new foundry for its Philadelphia branch.

It is reported that the American Mfg. Co., of Racine, will erect a $20,000 plant at Madison, Wis. A foundry 60x100 feet is included in the plans.

One of the first buildings to be put up of the new plant of the Otis Elevator Co., Chicago, will be a foundry 125x300 feet.

The Gulfport Foundry & Machine Works, Ltd., Gulfport, Miss., has been incorporated with a capital of $25,000.

Plans have been prepared for a foundry, 102x181 feet, for the Detroit Foundry & Mfg. Co., Detroit, Mich.

The Griffin Wheel Co. has abandoned its plant at Ft. Madison, Iowa, formerly operated by the Ft. Madison Iron Works.

The A. T. Nye & Son Co., of Marietta, O., will build an addition to its foundry.

The Minnesota Harvester Co. was incorporated at St. Paul Nov. 6 with a capital of $6,000,000. It embraces the American Grass Twine Co. interests and several Eastern capitalists. The incorporators are C. A. Severance, Robert E. Olds and Charles W. Withee, who with F. B. Kellogg and Alfred T. Eisberg compose the board of directors. These are all St. Paul men. Vice President O'Shaughnessy, of the American Grass Twine Co., announced that the new company is independent of the combination of harvester companies.

A large foundry is to be built by the Dem ing Co., Salem, O.

It is announced that the Canadian Locomotive Co. will remove its works from Kingston, Ont., to Montreal, P. Q.

The Morley Self Feeder Co. will put up a foundry at Leeds, near Sioux City, Iowa. The officers of the company are: W. Morley, president; L. W. Moody, vice-president and treasurer, and Harry Morley, secretary.

The Lackawanna Iron & Steel Co., of Buffalo, has leased the Lake Erie Engineering Works, recently vacated by the Allis-Chalmers Co. The plant will be used in the manufac-

ture of appliances required by the Lackawana Co. exclusively.

John T. Graham has acquired the Fairhaven Foundry & Machine Works at Fairhaven, Wash., and will place them in operation as soon as the necessary repairs can be made. The plant is to be enlarged also and considerable equipment will be purchased.

The Michigan Foundry Co. has been organized at Kalamazoo, Mich. About twenty molders will be employed by the new plant. Drills, punches, shears and machinery for manufacturing purposes are the specialties to be made by the new company.

The Hecla Iron Works Co., Chicago, has been incorporated with $50,000 capital for the purpose of engaging in the foundry trade. F. B. Johnston, E. D. Frazer and T. G. Vent are the incorporators.

The American Machine Mfg. Co. are incorporated with a capital stock of $125,000 to do business in Camden, N. J. Incorporators: J. T. Kavanaugh, H. S. Griffin and S. Simpson.

Detroit Convention of the National Founders' Association.

As we are going to press with the December issue of THE FOUNDRY the National Founders' Association is holding its sixth annual convention at Detroit, Mich. About 250 members are in attendance, making this one of the largest meetings in the history of the association.

PRESIDENT'S REPORT.

The report of President W. D. Sargent commented generally upon the progress made by the association in the five years of its existence. He believed a great advance has been made and that employer and employe today more fully recognize that their interests are largely mutual; that causes operating to the disadvantage of the one are nearly sure to cause injury to the other, and that enlightened self-interest demands proper consideration by each for the welfare of the other. The evolution that has taken place is from a state of unstable equilibrium in labor matters, maintained by force, to a state which depends more and more upon the recognition by both employer and employe of the truths which underlie all industrial relations. The members of the National Founders' Association while employing many members of the Iron Molders' Union, also employ large number of molders who are not members of the union. They have a plain duty to perform to this latter class. They have issued many cards to molders not members of the union who have faithfully served the interests of their employers, and they believe this pledge of the fairness of the association is highly appreciated by the recipients.

Referring to the recent conference at Detroit, the president said: "It is most gratifying to say to you that the desire exists, not only upon our part but upon the part of the Iron Molders' Union, to agree upon the disputed points, to recognize the great truths which exist and to co-operate with each other to bring about stable and permanent conditions. Since this desire does exist, there can be but little doubt that the agreement is bound to come—incomplete, perhaps, in its first form, but sure to be perfected as time goes on and the process of education advances."

Emphasis was put by the president upon the need of unanimity in the action of the association. Any member who refuses to be guided by the principles the association enunciates does untold harm to the association, just as the molders of any district who refuse to be guided by the agreements and advice of their officers diminish vastly the power of the union to advance the interests of its members. Some change has been made in the workings of the association in the past year, chief of which is the placing upon the commissioner of practically the entire responsibility for the executive work of the association. Referring to the commissioner, the president said: "He has proven a safe navigator through this year of agitation and industrial unrest, and his efforts have resulted in the largest increase in membership of any one year in the history of our association."

The year just closing has seen the end of the Chicago molders' strike and the commencement of strikes in Birmingham and Cleveland, while the association has successfully resisted the demands of the coremakers at Pittsburg and Milwaukee. In all the labor troubles of the year the association had used every means in its power to protect the rights of its members. The demands of employes have been many and urgent, and while the association had willingly granted everything that was justifiable, to demands that were deemed unreasonable it had offered a most determined resistance.

The institution of arbitration under the New York agreement had been found to involve certain departures from the rules laid down in the constitution and by-laws. A committee

had been appointed to make such changes as would remove all incongruities, and these will be submitted to the convention for its final action.

THE COMMISSIONER'S REPORT.

The report of Commissioner John A. Penton, which was next presented to the convention, was an exhaustive resume of the work of that officer in the past year. In referring to the relations of the association to the Molders' Union, the commissioner said that the employes' privilege to organize cannot be questioned; that if employers are determined to secure for themselves what is justly theirs, they must be as willing to concede to the employe such rights as are undoubtedly his. As to the policy of the association toward the union's claim of right to be recognized as an authority in the shop, he said that the great difficulty encountered, and the one which had inspired opposition to the shop committee as an influential factor, was the fact that the committee, when once established, became the official mouthpiece not only of other employes, but of all members of a local union, in any effort they might put forth to establish what are known and regarded as union conditions. It is the committee as the embodiment or personification of these conditions that inspires aversion to what is familiarly known as the shop committee. While there are members of the N. F. A. who feel that they should at all times be willing to meet and discuss with a committee of their own employes any question that may come up, they consider that a question of the union, or matters pertaining to union methods, ideas and policies should not enter into such discussion.

With the employe, the first thought in all union effort is compensation for his labor, all other considerations being secondary to this. In the matter of the apprenticeship ratio the fear of the union members has been that to increase the number of apprentices would give more molders than were required by the business, and that apprentices would be used freely, to the exclusion of skilled mechanics; so that the question really referred to the earning power of the member and the influence of the apprentice on such earning power. While the officers of the Iron Molders' Union seemed to favor some modification of the apprenticeship ratio, the action of the Toronto convention had been against any change. Particular attention was called to the resolutions passed at the Toronto convention, declaring any one who worked at molding in any capacity as hereafter to be eligible to membership in the union.

The matters of local agreements and of a minimum wage rate were commented on, and the commissioner explained that local agreements had been made in number of instances, temporarily conceding a minimum wage rate, these being entered into with a view of obtaining stable conditions and minimizing uncertainty. After giving local agreements on the minimum wage rate a full test, it was the unanimous judgment of the officers of the association that in all respects they had failed to bring to the foundry trade that measure of satisfaction and good feeling between employer and employe so essential to good results. A canvass of the membership of the asosciation on the subject of a minimum wage rate showed that 96 per cent of those replying were opposed to the minimum wage rate coupled with the union restrictions regarding apprentices and what may be considered unskilled molders. The association had been led to believe that some relief from these conditions would come from the Toronto convention. No action was taken there that would furnish the needed relief in any direction.

The commissioner reviewed at length the conference of October 8 to 11, held at Detroit between representatives of the two organizations. The discussions and resolutions growing out of that meeting are summarized in this issue of THE FOUNDRY. While no agreement was reached, the position of the two organizations was made plain by the prolonged consideration of the questions of minimum wage rate, apprenticeship and differentials between skilled and unskilled workers. It was decided that another meeting be held in the second week in January, when it is hoped some statement can be formulated concerning these matters that will bring about an agreement.

The commissioner said he did not find that foundrymen generally were averse to paying a fair wage rate, but the accompanying conditions regarding apprentices, inability to employ without friction molders at a lower rate on a plain class of castings or specialty castings, limitation of output, objections to laborers operating molding machines even on the most simple castings, union opposition to piece work and other union limitations and restrictions, created and perpetuated a feeling of antagonism that was costing and would cost the molders of the country a great deal of money.

Contrary to the general belief of employers,

the association's officers had found that in the past year especially a much fairer and more reasonable spirit had been shown by the officers of the Iron Molders' Union. Yet it was greatly to be regretted that in so many cases they had seemed to regard it necessary to resort to the out-of-date method of the strike. In all the strikes of the past four years against the National Founders' Association and its members, no one had been the gainer; a feeling of antagonism had been maintained, and the opposition of many employers to unions had been constantly fanned into a flame. This, in the end, could not be to the advantage of the wage earner. Yet the officers of the N. F. A. had met with union representatives constantly, and had extended to them a degree of cordial recognition which would have been impossible a few years ago, and which would not exist today as between foundry employers and employes but for the National Founders' Association. There were instances in plenty to prove that when strikes had been avoided, even though advised or ordered, and the men had remained at work, matters had eventually adjusted themselves to the satisfaction of all parties.

A large part of the report was given up to a summary of the wage troubles which the commissioner had been called upon to handle in the past year. There were no less than 156 of these. The Chicago trouble was given a great deal of space. The action of the Toronto convention in practically reversing the position union officers had taken in refusing to recognize this strike, and the appropriation of $5,000 from the union treasury for the expenses incurred in conducting this illegal strike were referred to as not tending to encourage confidence in the ability of the union to carry out agreements or to maintain the authority of its officers. The outcome of the Toronto action was the technical declaring off of the Chicago strike and the presentation of a demand for a uniform wage rate of $3.00 per day to both floor and bench molders, the discharge of non-union molders still employed in ten or a dozen foundries in Chicago, and the making of agreement on these terms for one year. The reply of the National Founders' Association was that it would not be a party, under any circumstances, to any further agreement with the molders in Chicago. While there are some shops in Chicago still open that are non-union, there is a general feeling of bitterness on the part of foundrymen there which the recent actions of the union have served to intensify.

Another matter that received special mention was the Birmingham, Ala., strike, which was ordered in the face of the request of representatives of the N. F. A. that action be postponed until the two associations would have time to discuss the important issue involved, namely, a 9-hour day with the same rate of wages as for 10 hours—$3.00 per day. The Birmingham foundrymen are being supported by the N. F. A. and are being well supplied with molders.

The Indianapolis foundrymen were strenuously opposed last year to the recognition of the minimum wage rate existing, and only agreed to countenance it through the present year. Recently they took the initiative in asking that the termination of the present agreement, which expires with the year 1902, there shall be no agreement whatever between employers and employes in Indianapolis. They ask for the privilege of hiring a certain number of men at a less rate than the minimum and for other concessions which are now under consideration. In referring to the growth of the association in the past year to a membership of 494, the commissioner said that this was a mark heretofore believed impossible; yet he thought the association should have double its present membership. With 1,000 foundry firms enrolled, it would be possible to secure for the members, without injustice to their employes, a more equitable condition of affairs than has yet existed.

SECRETARY'S REPORT.

The report of Secretary A. E. McClintock showed that there had been a net gain of 117 members in the past year, making the total at date 494. The total number of foundry employes working in shops of members is 27,389. The report reviewed in detail the meetings of the administrative council during the year, the matters that had been passed upon and the handling of the funds of the association in connection with the various strikes in Chicago, Birmingham, Milwaukee and Pittsburg. The association had established special headquarters in these cities. The use of the N. F. A. cards among molders who were entitled to the association's consideration for faithful service has been extended in the year and is now an important feature of its work.

Treasurer John R. Russel read his report showing expenditures for strikes and other purposes in the past year and a substantial balance on hand. A vote of thanks was given Mr. Russel for his excellent service in the past three years.

Notes from Various Sources.

J. W. Savage will have charge of the new foundry being built by the Gisholt Machine Co., of Madison, Wis.

H. S. Vrooman, of Chicago, has issued his yearly catalogue, which is sent free to those who ask for it. Mr. Vrooman has fallen into the pleasant habit of inserting therein a few things of general interest to the trade in addition to the arguments he advances in favor of his supplies. This year he has the following to say concerning molding sand:

A good molding sand will resist the pressure of the liquid metal, give free escape to the gases, separate easily from the casting when cool, leaving a clean, smooth surface.

Use as open a sand as the character of your work will permit.

An open sand will carry more water, can be rammed harder, will vent easier, and hold the blacking better than a strong sand.

The amount of free silica in sand denotes its openess or porosity; the amount of alumina, its strength or wearing qualities.

Add a little new sand to your heaps every day.

If you are not making smooth castings, try a finer riddle before trying a finer sand.

The same sand in different shops, on like work, under like conditions, must give like results.

The wearing qualities of sand should be a secondary consideration, as the best wearing sand is not always the safest or cheapest.

Local sands are not always suitable for local work.

Don't pour your work too hot and your castings will clean easier.

A sand sometimes cuts because it is not well cut.

The vent wire is the foundryman's preventive; administer it in large doses, on all kinds of sand.

Good sand will make a good mold, but it will not overcome poor molding.

It is easier to make the conditions suit a sand than it is to make a sand suit the conditions.

Walter Hoffman has taken charge of the architectural foundry of Richey, Brown & Donald, at Long Island City, N. Y.

The Rand Drill Co., of New York, have issued a general catalogue of the "Imperial" type of air compressors made by them, and a copy of same will be mailed to interested parties anywhere.

S. R. Church, of San Francisco, advises us that the second volume of "Analyses of Pig Iron" will be ready for delivery December 20. This volume is in no way a repetition of the contents of Volume No. 1, already published, but contains additional and entirely new analyses of the irons of the United States, Canada and foreign countries. It has been the purpose to make this, taken in connection with the volume preceding it, as complete a compilation of analyses of the pig irons of the world as can be brought together. The books are the only ones of their kind ever published, and fill a place hitherto unoccupied in the literature upon the subject. The second volume, now in press, will contain, in addition to the analyses referred to, highly valuable data regarding the fuel used in the production of irons, the capacity of the different furnaces, the character of ores used, and statistics relating to production. The illustrations have been made a special feature, and include views of furnace plants, cuts showing the fracture of the different pig irons, and half-tones of men prominently engaged in the pig iron trade. The two volumes, taken together, constitute as complete a record as can be obtained of the characteristics of the pig irons now in the world's markets, and will be found of value in every foundry and steel works. The price, per volume, postpaid to points in the United States and Canada, is $5.00; postpaid to foreign countries, 24 shillings.

N. A. Christensen, of Milwaukee, announces that the Christensen Engineering Co., with which he has been connected as superintendent since its organization and of which he is still consulting engineer, and with which his other interests remain undisturbed, will hereafter manufacture his air compressors connected with air brakes exclusively. This places under his control the manufacture of air compressors for all other uses. The air compressors furnished by him will be manufactured by the Christensen Engineering Co., under his designs, specifications and inspection. This arrangement also leaves Mr. Christensen free individually to extend his system of air compressors in a rapidly widening field. There are now in use over seven thousand of these compressors of all sizes and capacities constructed under his patents and used for various purposes. Mr. Christensen's engineering and sales offices are located in the Herman building, corner of Wisconsin street and Broadway, Milwaukee.

The C. A. Stevenson Pig Iron & Coke Co., of St. Louis, have been appointed exclusive

selling agents for La Follette Pig Iron in St. Louis and Western territory. This iron is the product of the La Follette Coal, Iron & Railway Co., located at La Follette, Tenn. The furnace of this Company went into blast the early part of October and is now producing a superior quality of strong, soft, foundry iron and the C. A. Stevenson Co. say that they are in a position to quote prices on same for prompt shipments as well as for scattered deliveries during the first six months of 1903. The Stevenson Co. have also recently opened an office at Columbus, Ohio, which is in charge of Mr. H. C. Newburgh.

The American Ship Windlass Co., Providence, R. I., has purchased a tract of land along the harbor where it intends to build wharves for the accommodation of vessels that come to their plant for repairs. The company also contemplates the erection of a new foundry.

The Chicago Pneumatic Tool Co., of Chicago, have issued catalogues of their air compressors and pneumatic hoists, which will be mailed free of charge to interested parties. Mr. J. W. Duntley, president of the Chicago Pneumatic Tool Company, sailed recently for Europe. He expects to spend about four weeks on the continent and states that it is his intention to establish, either in England or Scotland, a new plant for the manufacture of pneumatic tools. The design of this new plant will be practically the same as that of the factory now being operated by his company at Detroit, Michigan, which is the finest equipped manufacturing establishment of its kind in the world

Deaths.

Charles F. Moehlman, foreman of the General Electric Co.'s foundry at Schenectady, N. Y., died suddenly Oct. 31. He was born in Nittlestadt, Westphalia, Germany, in 1856, and learned the molders' trade in his father's foundry. A short time after completing his service in the German army he emigrated to America, arriving here in 1882, and working in several foundries until 1888, when he secured employment with the General Electric Co. as a molder and continued with this concern until his death. He was appointed foreman of the company's iron foundry in 1895.

Philo H. Skidmore, Jr., of the Pacific Iron Works, Bridgeport, Conn., died Nov. 8, aged 51.

Robert Cumming Schenck, president of the Dayton Malleable Iron Co., and one of the most prominent citizens of Dayton, O., died in Faxton hospital, Utica, N. Y., on Tuesday, Oct. 14. Death was the result of exhaustion following an operation. He was born at Franklin, O., Oct. 2, 1845. Graduating from Miami University in 1864, he entered the Union service, being on a gunboat during the Kirby Smith raid and in the militia at the time of the John Morgan raid. In May, 1864, he enlisted in the 146th O. N. G. and served during the campaign in the West Virginia mountains. In the early 80's he became president of the Dayton Malleable Iron Co. He was also a director of the Columbia Insurance Co., president of the Dayton National Bank, and a director of the C. H. & D. Railroad.

M. A. Baxter, general foreman of the foundry and wheel departments in the Southern Pacific Railway shops at Sacramento, Calif., died very suddenly Oct. 20. He was born in Vermont, Oct. 17, 1836, and at the age of 16 went to New Hampshire, where he learned the molders' trade at the Amoskeag Locomotive Works. For years afterward he went to Providence, and was employed at the works of Collins & Nightingill, at that time one of the largest establishments in New England. In 1858 he came to Chicago and worked in the McCormick Reaper Works, and in 1864 opened a foundry in Elgin, Ill., operating it for four years, when he disposed of his property and set out for the Golden State, where he entered the employ of the then Central Pacific Railroad Co., and after working as a journeyman for seven or eight years, was given charge of the wheel department. In 1881 he was promoted to the position of general foreman of the foundry and wheel departments. He was very popular with the men under him and always stood up for their rights when any misunderstanding arose.

Joseph Woods, senior member of the firm of J. Woods & Sons, of Marine City, Mich., died Nov. 8. Mr. Woods established the iron foundry and had been associated with numerous vessel industries for many years.

Peter Walrath, owner of the foundry which bears his name at Chittenango, N. Y., died Oct. 30. He was born in that city Nov. 12, 1833, and succeeded to the foundry business upon the death of his father in 1861.

William Landrath, an old time foundryman of Niagara Falls, N. Y., died Oct. 19. He was born in Dublin, Ireland, July 19, 1826, and in company with Wm. Smith purchased a foundry at Niagara Falls in 1849, which he conducted for more than 20 years.